tember 1946

Chemical Industries

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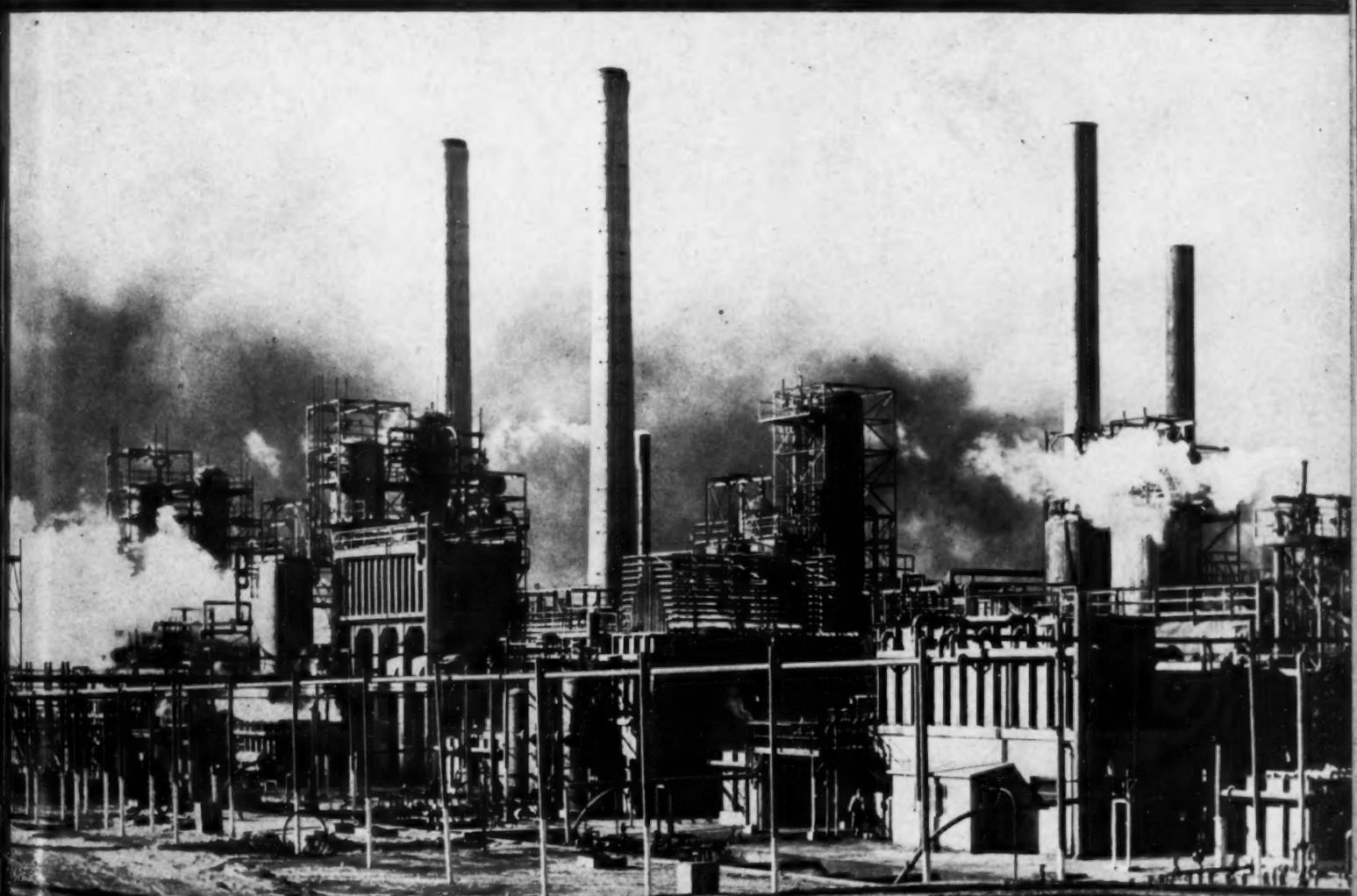

PETROLEUM to CHEMICALS—Refinery and hydrocarbon production unit at Borger, Texas

New Petroleum Hydrocarbons for Chemical Industry p. 469

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THE CHEMICAL BUSINESS MAGAZINE

Chemical Industries

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NUMBER 3

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COVER: A refinery of the Phillips Petroleum Co. at Borger, Texas

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THE READER WRITES

Market Research Series

To the Editor of Chemical Industries:

I have been very much interested in the series of articles which you have been running by Dick Lawrence on "Sources of Information for Chemical Market Research."

I feel that these articles are a very distinct contribution to the industry, and I am wondering whether these may not be put in book form.

R. B. WITTENBERG
International Minerals & Chemical Corp.
20 N. Wacker Drive
Chicago 6, Illinois

We appreciate Mr. Wittenberg's comments and are glad to say that a booklet reprint of "Information Sources for Chemical Market Research" will be published. However, there are a number of articles yet to appear in Mr. Lawrence's series, so that the complete booklet will not be on sale until early next year. Reprints of individual articles will not be available.—EDITOR.

Synthetic Detergents

To the Editor of Chemical Industries:

On page 964 of your June issue, you called attention to the fact that the United States production of synthetic detergents in 1928 was zero. However, you also pointed out in the same article that the first synthetic detergent, sulphonated castor oil, was introduced almost 100 years ago and is still being used at the rate of about 30,000,000 pounds per year.

The United States Tariff Commission report on synthetic organic chemicals, in Table 17A gives the total for both cyclic and acyclic surface active agents as about 87,000,000 pounds production in 1943, with the 1941 sales considerably below that figure. This does not seem to agree with the 1941 figure of 100,000,000 pounds given in your article, unless we make suppositions not specifically mentioned in your excellent review. Is it possible that the United States Tariff Commission did not include the approximately 35,000,000 pounds of fats and oils that were sulphonated in 1943? Did you include your 30,000,000 pounds of Turkey Red Oil in your production estimates for 1941 and 1945? Obviously the Tariff Commission did not include all the sulphonated castor oil under the heading of surface active agents, but I don't know where they put it, and I do have the figures for 1943, 1944, and 1945 on sulphonated fats and oils, as given in the August 21, 1946, "Facts for Industry."

Presumably, your 1945 estimate of 125,000,000 pounds capacity covers all types of surface active agents, of which synthetic detergents are only a part. How big a part would you estimate synthetic detergents take? Is it possible that your totals include the "builders," such as sodium sulfate, which are added to active organic detergents? If so, this would not only make the figure for surface active agent production appreciably larger than it really is, but it would also make production figures for synthetic detergents unduly high in proportion to the figures for other surface active agents which do not use builders.

H. C. SPEEL
Minneapolis, Minnesota

Mr. Speel, a well-known author in the synthetic detergents field, has indeed brought forth some questions requiring clarification. Much of the confusion arises from the loose use of the term "synthetic detergent." It is properly applied only to those synthetic surface-active agents which are used primarily for their detergent action. Turkey Red oil is not, then, strictly a synthetic detergent.

The 1941 figure of 100,000,000 lbs. production was taken from the January 5, 1942, issue of Time, *and was quoted by L. F. Hoyt, National Aniline Division, in a published article, "Detergents—Old and New." The 1945 figure of 125,000,000 lbs. capacity was taken from a market survey made by an interested concern, the name of which, of course, cannot be divulged. It includes only synthetic detergents, exclusive of builders, additives, and surface-active agents used primarily for non-detergent uses. The 1941 and 1945 figures, therefore, do not admit a direct comparison.*—EDITOR.

Our Face Is Red

To the Editor of Chemical Industries:

An inconsistency appears in the article, "Synthetic Gasoline From Natural Gas," by P. C. Keith, which appeared in your July, 1946, issue. In the first part of the article it is noted that the Hydrocol plant produces 150,000 pounds per day of crude alcohols, while the flowsheet on the next page shows a production of 150,000 barrels per day. This latter figure is obviously impossible.

WALTER F. HUPPKE
West Disinfecting Co.
42-16 West Street
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Correction accepted.—EDITOR.

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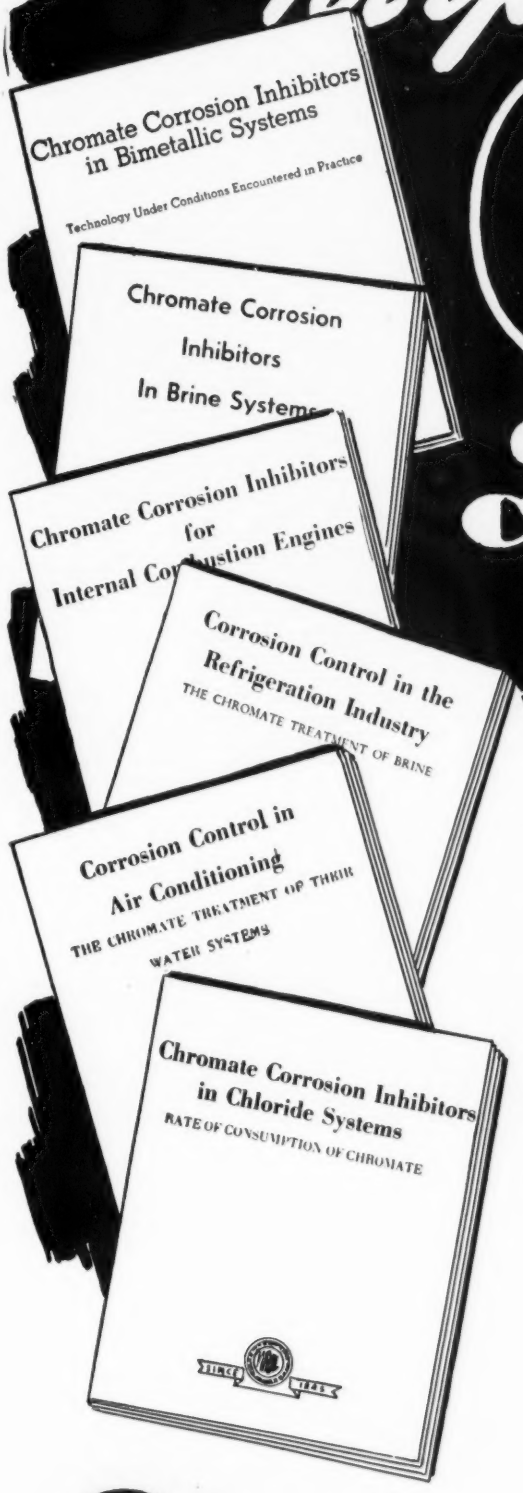
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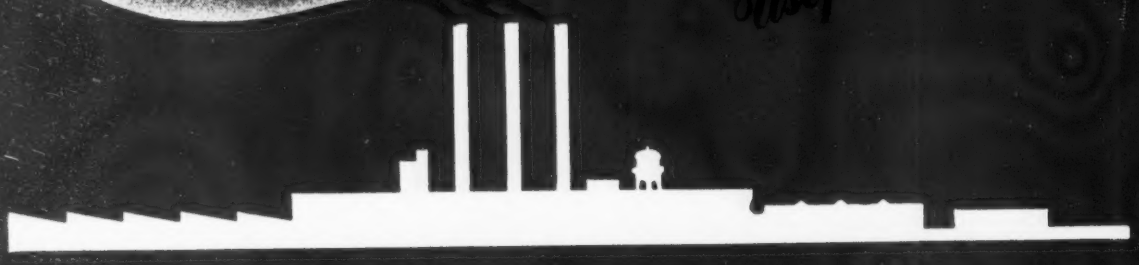

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WASHINGTON

T. N. SANDIFER reporting

Technical Personnel Deferments . . . Barite Controversy . . . Coal Freight Rates Alcohol Grain Allotments . . . Molding Powder Distribution . . .

Draft Deferments

SELECTIVE SERVICE HAS furnished the American Chemical Society with what is intended to be reassurance as to the drafting of technical and scientific personnel. Nevertheless in view of the many Selective Service directives that developed backfires when actually put in operation during the war years, it is only natural that some reservations may exist among those most affected.

Until otherwise proven however, it is only fair to assume that the Director of Selective Service means just what his letter on the subject states to be his position. His letter seeks to clarify Local Board Memorandum 115, which it will be recalled, so restricted any deferment, that industries depending on scientific or technical key men, protested. It was their contention that nobody could conceivably fit into the narrow deferment framework in this memorandum, if a local board chose to stick to the literal requirements in the memorandum.

"The press release," said Director Hershey in his present letter, "of necessity did not set forth the detailed story."

While it is correct, he continued, that he had ordered deferment in Class 11-A to be closely limited "to those the boards should find to be irreplaceable and indispensable" to essential national existence, the memorandum defined the activities involved as "of such importance that any disruption thereof would adversely affect the physical well-being, public safety, or economic life of the community or the Nation."

"This language," Director Hershey states in his letter, "is intended to give local boards full discretion in determining who is and who is not essential. Obviously the scientifically trained individual who is engaged in important research or other work of value to the physical well-being or economic life of the country would be entitled to deferment consideration."

Furthermore, he said, the memorandum provides deferment consideration for certain students, teachers, and research workers in the same manner as was provided in an earlier order. He explained the limitation of such deferments to 2500, as due to an initial miscalculation, based on information that there would not be over 1500 such deferments. He said Selective Service has now been advised that the early estimate was wrong and that there are additional men who would qualify under established criteria.

"In a recent meeting at the White House," Director Hershey said, "where this entire matter was discussed, I advised the representatives of the various Government agencies that this Headquarters would do everything possible to protect men who were of such importance that their removal from their civilian occupations would adversely affect reconversion, as well as scientific research."

It is still the case that local boards will be entrusted with observing this memorandum, and a great deal of the weakness in the whole Selective Service operation has been in the dominant position of such boards. What will follow depends almost entirely on the boards' construal of the memorandum.

Barite Freight Rates

THE INTERSTATE COMMERCE COMMISSION is expected to hear arguments in September on a Commission examiner's recommendation for higher railroad rates on unground barite from Southern and mid-Western producing areas, that if adopted, may have a lasting adverse effect on the Southern producers, through widening the door to foreign competition.

The report holds that there are no transportation conditions to justify lower rates on unground barite (crude barium sulphate) not precipitated or refined by chemical process, than on ground barite.

Both barite shippers and chemical industry barite consumers have protested the proposed finding.

"Should the proposed report be adopted by the Interstate Commerce Commission," counsel for E. I. duPont deNemours Company and others, warned recently, and should the rail carriers increase their rates to the levels proposed in the recommendation, from Georgia producing areas to Newport, Del., where barite enters chemical processing, it would probably force Eastern users to turn to foreign supplies. The present rates were determined primarily with foreign competition in mind, it was pointed out. Any increase would make shipments from domestic sources prohibitive, in competition with cheaper water rates on the imported commodity.

It is common knowledge, the ICC was reminded, that the net cost of imported unground barite delivered on the Atlantic seaboard, is less than shipments from Georgia. As matters now stand, over 60 percent of unground barite consumed at Newport is imported from foreign sources.

Prewar sources included nearly a dozen foreign countries. The movement from Europe was largely cut off by the war, including such sources as France, Germany, Greece, Italy, Spain, the Netherlands, and Yugoslavia, but there has been no interruption of shipments from Nova Scotia, an important source on this side.

The rates proposed in the pending report would be increased to virtually $1.57 a ton on unground barite from Cartersville, Ga., to Wilmington, Del., and about $2.15 per ton at Chicago. From Missouri the rate on unground barite to Wilmington, Del., and Philadelphia, would go up from 30.31 cents per 100 pounds to 43 cents per 100.

The situation is peculiar in that the carriers themselves did not precipitate the issue. It arose primarily in differences now existing between rates on ground and unground barites, which some shippers have sought to change. It is not desired here to get into the refinements of this situation, beyond repeating the contention of one Eastern chemical user, that if the proposed rates become effective, the Missouri shippers will be equally or more adversely affected, on shipments to the Eastern market, than those in Southern producer areas. It is understood that shippers from Arkansas, however, sell largely to oil fields in the Southwest, where the product in the form shipped by those producers is used in drilling operations.

Barite, in one or another form, is widely used—in lithopone, brake linings, plastics, glass, rubber, sugar refining, and in various chemical processes. (See p. 557.)

Further Freight Rate Protests

THE AMERICAN PAPER and Pulp Associa-

tion of the U. S. has protested to the Interstate Commerce Commission against granting additional emergency relief to railroads on shipments of lignite, coal and coke. The Commission recently authorized increases of 6 cents per net ton or 7 cents per gross ton on coal. The Association protested against what it terms a "proposal to substitute without hearing, a rate of 15 cents per net ton or 17 cents per gross ton" for these rates, more than doubling the relief already granted.

It is estimated the paper industry uses 15,000,000 tons of coal per year, so that the proposed additional increase would cost the industry about $1,200,000 annually.

Commercial Alcohol Producers Oppose Grain Allotment

INDUSTRIAL ALCOHOL MANUFACTURERS are vigorously opposing a move by beverage distillers which would shift the present basis of grain allocation to a partly historical factor of grain use, which the commercial producers charge, would shut out many plants, and give a major share of grain to beverage makers.

The proposal, by Distilled Spirits Institute, was made at a hearing in the Agriculture Department in July. Under War Food Order 141, the department has followed the practice initiated by the War Production Board earlier, and has apportioned grain for all distilling on the basis of plant capacity.

Industrial alcohol manufacturers have informed the Department that a change to a partly historical base, taking into consideration the pre-war grain use of registered distilleries making beverage alcohol, would have the effect of depriving many war-born industrial alcohol makers of essential raw material. Also, it was pointed out, in the case of plants normally using blackstrap, and forced to use grain for lack of molasses, the proposed change would cut off their only substitute material.

Molding Powder Distribution Attacked in Congress

THE HOUSE SMALL BUSINESS Committee has called on the Commerce Department to make an investigation of Civilian Production Administration actions affecting distribution of plastic molding powders and synthetic resins to smaller claimants under PR-28.

The Commerce Department would act through its Office of Small Business, recently established by Secretary Wallace to aid independent business concerns.

The House Committee, in a special report, which it called to the notice of the Commerce agency, said:

"The Civilian Production Administration, in Direction 17 to PR-28, says:

" 'The shortage of plastic molding powder, plastic molding compounds and synthetic resins has become so severe that many consumers will not be able to obtain sufficient materials to maintain minimum economic rates of operation. For this reason, the CPA will not be able to offer assistance to manufacturers to support minimum economic rates of production'."

The Committee commented: "The effect of CPA's action is to remove the assistance heretofore available for small plants needing these materials. Under the standard provisions of PR-28, small plants and only small plants were entitled to sufficient priorities assistance to maintain a minimum economic production rate, regardless of whether the item represented more than a bottleneck."

The Commiteee continued, "Now, says CPA, the supply of these plastic materials is too short to give even this minimum protection, and instead of taking steps to distribute this scarce commodity equitably, in accordance with its responsibility, this agency adopts a hands-off policy."

In this and other actions, the Committee charged, CPA seems to be reversing the whole principle of distributing scarce materials under the Second War Powers Act.

"When an item is not too tight, the agency apparently thinks it is all right to give a small plant a minimum amount of assistance. When the supply starts to tighten up, the help to small plants is then withdrawn," the Committee charged.

Novel German Cement

COMMERCE DEPARTMENT'S OFFICE of Technical Services has reported a "high early strength" cement developed by Germany and discovered by American technicians since the war.

The cement is stated to have special properties making it valuable for use in construction where high initial strength is required. It is composed of finely ground calcium, aluminum, ferrous and silicon oxides, intra-fused before being ground. It can be poured with safety down to minus 7 degrees Centigrade, but cannot be mixed with Portland cement because the heat given off in setting is such as to break down the Portland. It is also pointed out that the cement is three times as costly as Portland, hence can be used economically only in jobs where this special characteristic of quick strength is needed.

Soda Ash Priorities

OBJECTIONS TO CHANGING the policy of granting virtually no priority assistance in obtaining soda ash have been presented to the CPA by the Soda Ash Advisory Committee. For, because of the short supply of this alkali, the members claim that any considerable tonnage shipped new consumers under priority would effect unfair diversions from established consumers.

Too, if rating of orders for soda ash starts, so many consumers would be able to claim eligibility that utter confusion would result.

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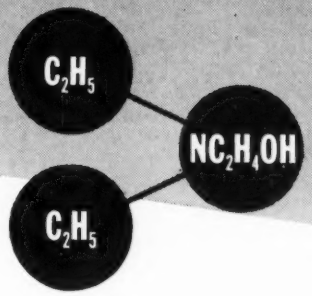

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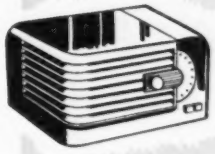
Mining Representative: ANDREW CLAUSEN, 1826 Herbert Ave., Salt Lake City 5, Utah
Canada: SHAWINIGAN CHEMICALS LTD., Montreal, Quebec
Export: AIRCO EXPORT CORP., New York City

SYNTHETIC ALCOHOLS

ALLYL

A versatile alcohol whose hydroxyl group and double bond both take part in reactions. Used in manufacture of resins, perfumes, flavorings, pharmaceuticals.

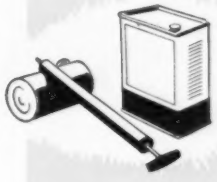


SECONDARY BUTYL

An economical alcohol possessing moderate evaporation rate plus excellent solvent action. Adds cutting power to polishes and cleaning solutions. Possible syntheses: esters, essences, perfumes, dyestuffs, flotation reagents.

TERTIARY BUTYL

A stable water-miscible alcohol. High purity. Useful in extraction of drugs; as a coupling agent in manufacture of insecticides, disinfectants and industrial cleaners; denaturant; synthesis of resins, perfumes, germicides.



DIACETONE

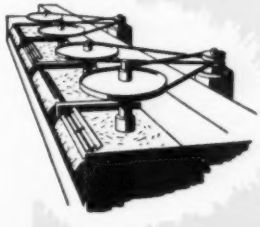
High boiling solvent. Functions both as an alcohol and a ketone. Mild odor makes Diacetone especially suitable for interior brushing lacquers — nitrocellulose and cellulose acetate types. Component of hydraulic brake fluids.

ISOPROPYL *(Refined)*

New high standard of purity increases the value of Isopropyl for formulation of hair tonics, shampoos, massage preparations, lotions, liquid soaps, emulsions, astringents and antiseptics. Likewise valuable in preparation of vitamins, biologicals and drugs.

METHYL ISOBUTYL CARBINOL

Moderate evaporation rate makes this alcohol a desirable latent solvent for nitrocellulose lacquers; resin solvent for phenolic type baking finishes . . . alcohol portion of a solvent for synthetic alkyd and urea-formaldehyde baking finishes. In combination with other materials, used as a frother in the flotation recovery of certain copper and zinc ores.



SHELL CHEMICAL CORPORATION

100 Bush Street, San Francisco 6 500 Fifth Avenue, New York 18
Los Angeles • Houston • St. Louis • Chicago • Cleveland

Maybe we've been too Modest

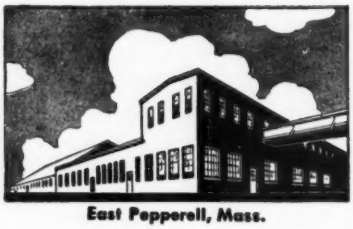
ABOUT BEMIS MULTIWALL PAPER SHIPPING SACK FACILITIES

For years, Bemis has been a leading manufacturer of multiwall paper shipping sacks. Six plants, strategically located north, south, east, and west, have given Bemis customers in the chemical industry the advantages of flexibility and capacity in production.

Even in the face of manufacturing and shipping difficulties during the past few years, this flexibility and capacity, plus the Bemis system of planned production, has enabled us to make an unusual record in fulfilling shipping promises and in maintaining quality for our regular multiwall customers.

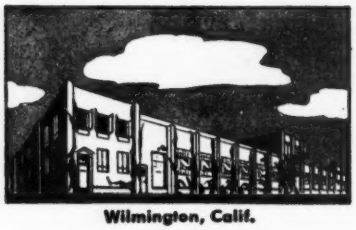
When you need multiwall paper shipping sacks for your chemical products, think of Bemis. It pays to be a Bemis Multiwall Paper Shipping Sack customer.

Peoria, Ill.


East Pepperell, Mass.

Mobile, Ala.

San Francisco, Calif.


Wilmington, Calif.

St. Helens, Ore.

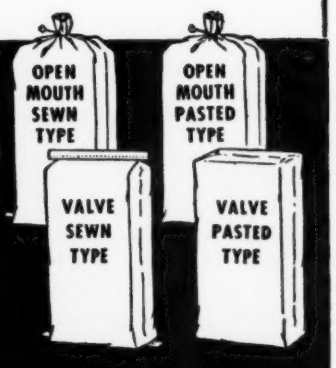
Bemis Multiwall Paper Shipping Sacks

6 PLANTS

Peoria, Ill. · East Pepperell, Mass. · Mobile, Ala. · San Francisco, Calif. · Wilmington, Calif. · St. Helens, Ore.

BEMIS BRO. BAG CO.

OFFICES: Baltimore · Boston · Brooklyn · Buffalo · Charlotte · Chicago · Denver · Detroit · East Pepperell · Houston · Indianapolis · Kansas City · Los Angeles · Louisville · Memphis · Minneapolis · Mobile · New Orleans · New York City · Norfolk · Oklahoma City · Omaha · Orlando · Peoria · St. Helens, Ore. · St. Louis · Salina · Salt Lake City · San Francisco · Seattle · Wichita · Wilmington, Calif.



READILY AVAILABLE IN COMMERCIAL QUANTITIES

B & A Metallic Nitrates

(PURIFIED AND REAGENT GRADES)

From Aluminum to Zinc—whenever your production program calls for one of the Metallic Nitrates, make the Baker & Adamson Division of General Chemical Company your source of supply.

These B & A Fine Chemicals are available in tonnage or other commercial quantities with two grades of most to choose from: *Purified*, for general manufacturing use; *Reagent*, for more exacting requirements.

Into their production goes all of the skill and science Baker & Adamson has gained in 64 years of "setting the pace in chemical purity." That is why B&A Metallic Nitrates are products of highest quality in every grade. That is why you can be sure—and be satisfied—when you specify B&A Metallic Nitrates for your operations.

ALUMINUM
NICKELOUS
CHROMIUM
COBALTOUS
CADMIUM
CUPRIC
LEAD
Ferric
Magnesium
Calcium
Zinc
and others

REAGENTS
B&A
STANDARD OF PURITY
FINE CHEMICALS

GENERAL CHEMICAL COMPANY

BAKER & ADAMSON DIVISION

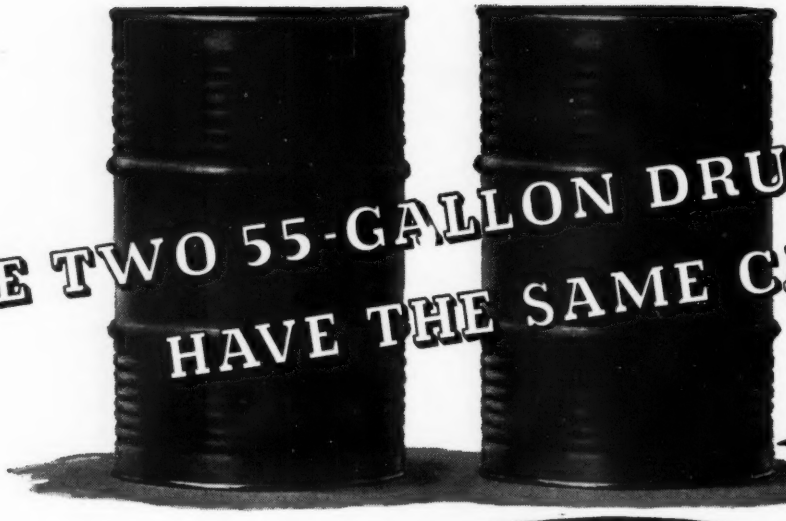
40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Birmingham* • Boston • Bridgeport • Buffalo* Charlotte* • Chicago* • Cleveland* • Denver • Detroit* • Houston • Kansas City • Los Angeles* Minneapolis • New York* • Philadelphia* • Pittsburgh* • Providence • St. Louis* • San Francisco* • Seattle Utica • Wenatchee (Wash.) • Yakima (Wash.)
In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks carried here.

THESE TWO 55-GALLON DRUMS HAVE THE SAME CAPACITY



–but one with Tri-Sure Closures will drain

8 OUNCES MORE

than the other

INSIDE OF HEAD OF 55-GALLON DRUM

The T-Square Test shows the flush fitting of the Tri-Sure Flange, which guarantees full drainage.

THE REASON being that the Tri-Sure Flanges engage *perfectly flush* with the inside of the drumhead. Tri-Sure assures *complete drainage* — prevention of waste — and delivery of full quantity.

Every time you make a shipment, for instance, of 10,000 55-gallon drums, this Tri-Sure characteristic saves over 650 gallons. This is only one reason why drum users all over the world have found that it always *pays* — in the prevention of *waste*, as well as leakage, seepage and tampering — to equip their drums with Tri-Sure Closures. Your customer receives exact gallonage, as filled — every time — when you specify "equipped with Tri-Sure Closures" on every drum order.

Tri-Sure
Reg. U. S. Pat. Off.
CLOSURES

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

Make

"Standard"

BICHROMATES

your standard

PRIOR CHEMICAL CORPORATION - NEW YORK

420 LEXINGTON AVENUE

Chicago Office: 230 N. Michigan Ave.

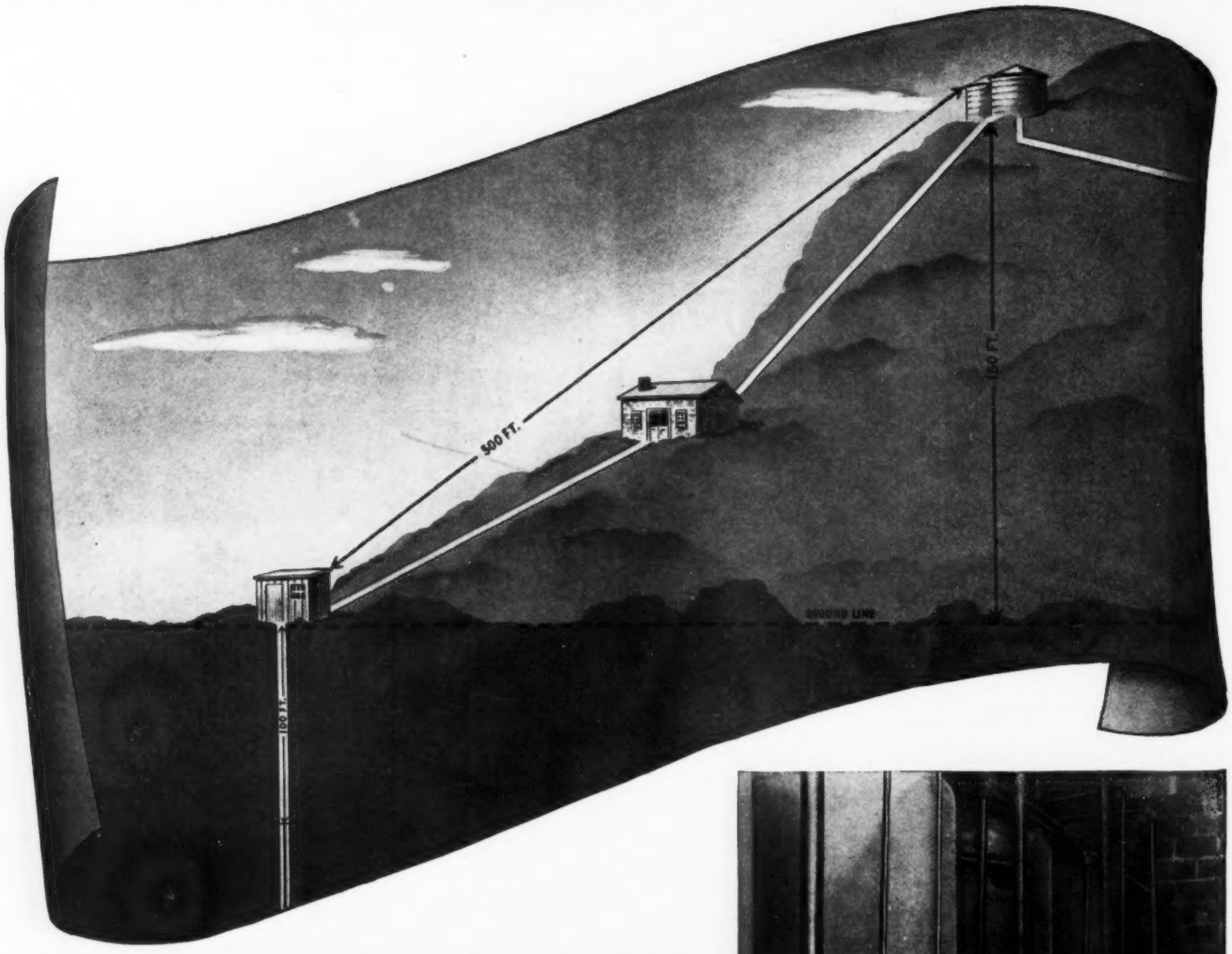
Selling Agents for

STANDARD CHROMATE DIVISION

Diamond Alkali Company, Painesville, Ohio

BICHROMATE OF SODA • BICHROMATE OF POTASH • CHROMATE OF SODA

LIFE...ON THE



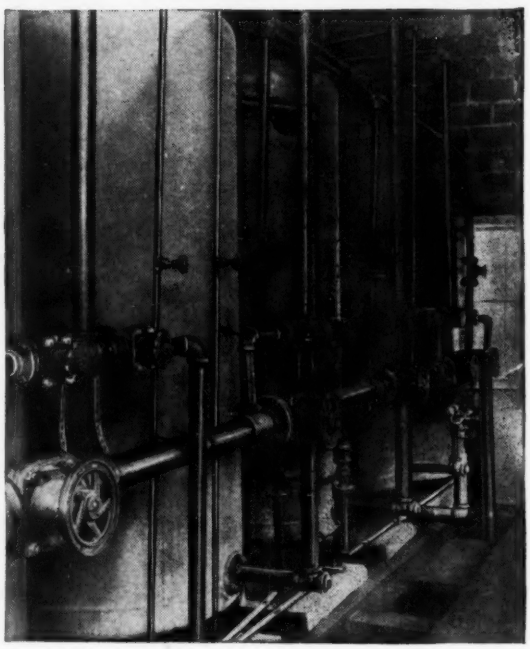
FILT-R-STIL* DEMINERALIZATION UNIT PROVIDES 9,000 GALLONS POTABLE WATER PER DAY FOR COAL MINING COMMUNITY

Water was brackish and unpotable in the coal mining community of David, Kentucky. The community was forced to truck in approximately 8,000 gallons of water per 24 hours. This water was stored in a large reservoir tank feeding the town of about 100 homes by gravity distribution system.

Cyanamid engineers studied the problem. The result was the building and installation of a complete FILT-R-STIL ion-exchange water demineralization unit, especially designed to meet this particular water problem. This unit strips the brackish water of its ionizable solids content to provide 9,000 gallons of potable water per day for the community at a cost of only $1.50 per thousand. This means a potable water supply at much less cost than when it was trucked in, and also makes the community independent of an outside water source.

The FILT-R-STIL unit shown here was used for the coal mining community installation. Other units are also available in capacities from 10, 30, 150, 300, 600, to 1,200 gallons per hour to meet all requirements for quantities of "chemically pure" water. Special units have also been designed for applications requiring capacities in excess of 1,000,000 gallons per day. All units are completely self-contained, easy to install, maintain, and operate.

Cyanamid will be glad to work "on location" with any community to solve a potable water problem, or with any company where a FILT-R-STIL unit may supply the answer to the need for demineralized water.



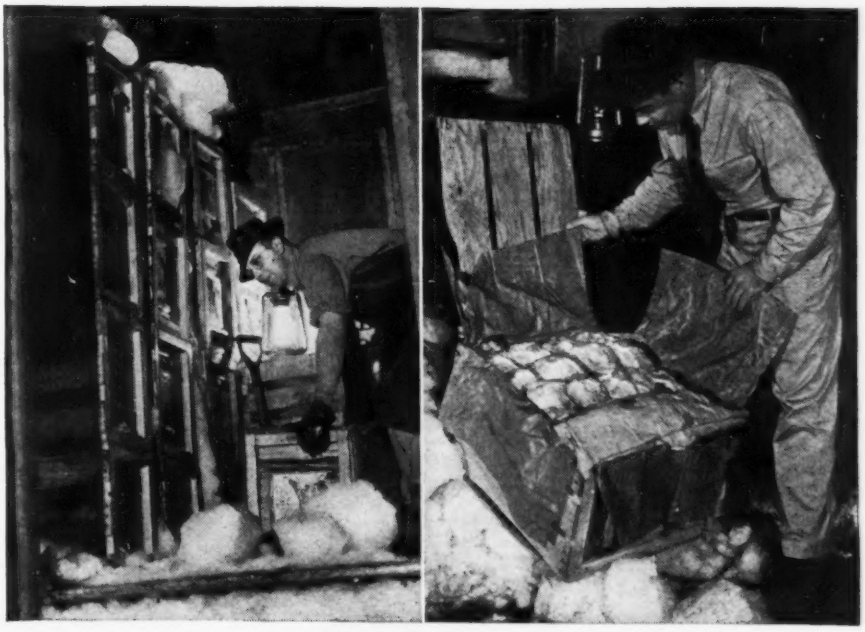
(*Above*) **THIS FILT-R-STIL** unit, consisting of four treating towers containing beds of IONAC* Resins which remove dissolved minerals from brackish waters, was installed in the David, Kentucky, coal mining community. Water is fed under pressure and delivered through a conductivity cell. When resins are exhausted a regenerative system restores unit to full operating efficiency.

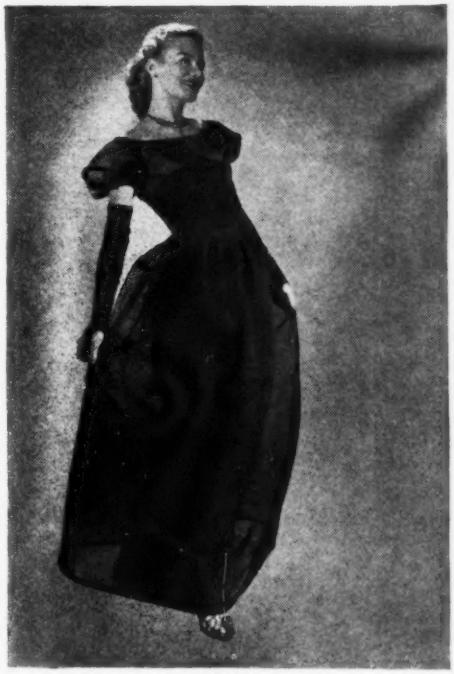
CHEMICAL NEWSFRONT

PERISHABLE FOODS PROTECTED BY WET-STRENGTH PAPER CRATE LINERS MADE WITH PAREZ* RESIN 607

Fruits, vegetables, and other perishable foods come to market crisp, cold and fresh when shipped in crates lined with wet-strength paper made with Cyanamid's PAREZ Resin 607. For this resin imparts high wet-strength to paper crate liners, helping to keep contents unharmed even though packed in ice and exposed to continuous moisture. It also imparts sufficient strength that liners often hold contents intact even though crates are broken in transit. Thus PAREZ Resin-treated papers provide extra protection for produce and reduce waste from spoilage.

Crate liners are only one of the many paper products being given new value and importance because of properties imparted by PAREZ Resin 607. Complete data on the use of PAREZ Resin 607 for the production of high wet and dry strength paper for a wide variety of utilitarian and decorative uses is available to paper manufacturers.





(*Left*) **SHEER FABRICS** can now be given lasting crispness, and added soil resistance with SHEERSET† Resin, product of Cyanamid's Textile Resin Department. SHEERSET Resin can be applied to cotton, rayon, and acetate sheer woven fabrics and mixtures as a wash-resistant, crisp, resilient finish. Treated fabrics retain their original firm texture, show no appreciable shrinkage, fading, or change in shape after repeated laundering or dry cleaning.

(*Right*) **CUPS AND DISHES** molded of Cyanamid's MELMAC* plastic by the Watertown Manufacturing Company are lightweight, easily handled and cleaned. MELMAC tableware is durable, attractive, odorless, and tasteless, with a hard, colorful surface.

*Reg. U.S. Pat. Off. †Trade-mark

AMERICAN Cyanamid COMPANY Industrial Chemicals Division
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

FEATURED CHEMICALS in the PFIZER FAMILY

- Acetyl Tributyl Citrate
- Acetyl Triethyl Citrate
- Ammonium Oxalate
- Ascorbic Acid
- Bi-Cap Flour Enrichment Mixtures
- Bismuth Preparations
- Calcium Gluconate
- Citric Acid
- ✔ Citrate Esters
- Cream Tartar
- Fumaric Acid
- Gluconic Acid
- Glucono Delta Lactone
- Iron and Ammonium Citrates
- Iron and Ammonium Oxalate
- Iron Gluconate
- Iron Oxalate
- Itaconic Acid
- Niacin
- Niacinamide
- Oxalates
- Penicillin
- Potassium Iodide
- Potassium Oxalate
- Riboflavin
- Rochelle Salt
- Sodium Citrate
- Sodium Gluconate
- Tartaric Acid
- Thiamine
- Triethyl Citrate
- *—and many other chemicals*

no. 4 in a series:

CITRATE ESTERS

In the production of lacquers and film forming materials, Pfizer Citrate Esters offer a wide choice of solvent plasticizers.

If you want to impart oil resistance to films, for example, Pfizer *Triethyl Citrate* may be the ester you need. If you want to inhibit discoloration of products by light, it may pay you to investigate Pfizer *Tributyl Citrate*. As a plasticizer for cellulose acetate, Pfizer offers its *Acetyl Triethyl Citrate*, while its *Acetyl Tributyl Citrate* has given good results as a solvent plasticizer for nitrocellulose, ethyl cellulose and other cellulose esters and ethers.

Write for further information on these esters. Each has specific characteristics which specially suit it for certain specific uses. Yet each has one thing in common with the more than a hundred products bearing the Pfizer name: Each reflects its maker's background — a business founded and maintained for nearly a century by chemically-minded men who have consistently kept out in front with the latest proved developments of modern science. Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 West Grand Avenue, Chicago 10, Ill.; 605 Third St., San Francisco 7, Cal.

PFIZER

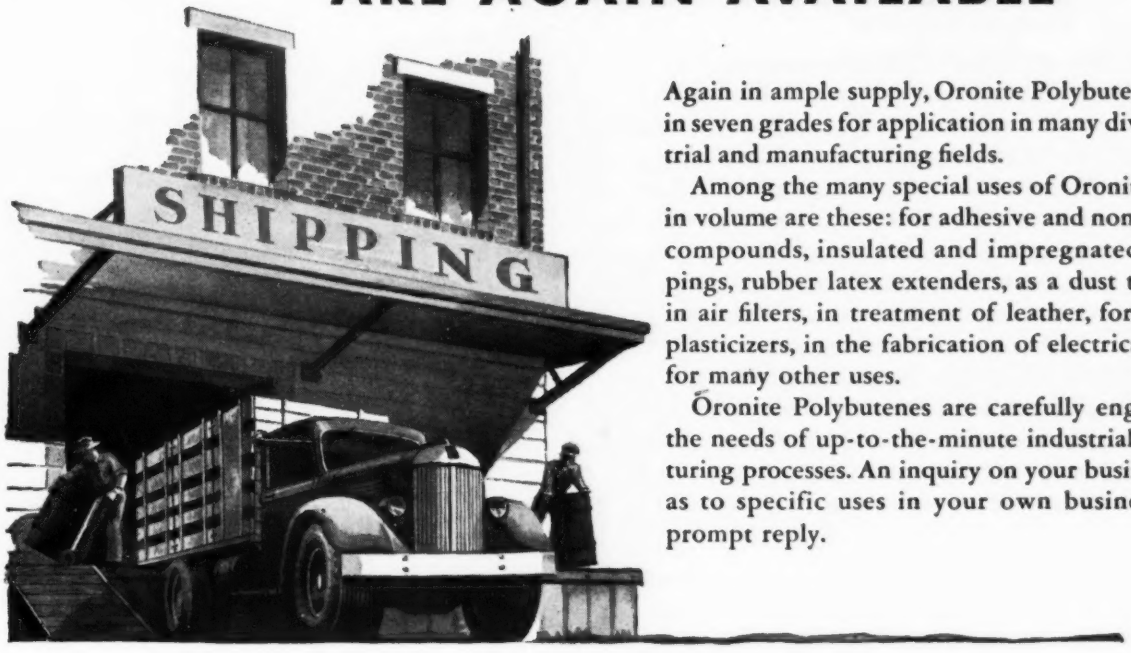
Manufacturing Chemists Since 1849

ORONITE CHEMICALS

Reg. U. S. Pat. Off.

THE NAME TO WATCH IN CHEMICALS

ORONITE POLYBUTENES ARE AGAIN AVAILABLE



Again in ample supply, Oronite Polybutenes are offered in seven grades for application in many diversified industrial and manufacturing fields.

Among the many special uses of Oronite Polybutenes in volume are these: for adhesive and non-drying gasket compounds, insulated and impregnated paper wrappings, rubber latex extenders, as a dust trapping agent in air filters, in treatment of leather, for paraffine wax plasticizers, in the fabrication of electrical devices, and for many other uses.

Oronite Polybutenes are carefully engineered to fill the needs of up-to-the-minute industrial and manufacturing processes. An inquiry on your business letterhead as to specific uses in your own business will bring prompt reply.

1240

TYPICAL TESTS:

	No. 8	No. 12	No. 16	No. 20	No. 24	No. 32	No. 64
Flash Point, Clev.°F.	315	340	360	380	435	500	540
Viscosity 100°F. SSU	358	3390	5425	17160	49750	167500	347600
Viscosity 210°F. SSU	52	154	210	528	1060	3065	6075
Viscosity Index	71	75	80	100	104	115	119
Pour Point °F.	—30	—5	0	10	20	40	55
Solid Point °F.	—35	—10	—5	5	15	35	50
Gravity, API	35.4	32.0	31.0	29.8	27.9	26.0	25.0
Spec. Gravity	.8478	.8654	.8708	.8772	.8877	.8984	.9042
Lbs. Per Gallon	7.059	7.206	7.251	7.305	7.392	7.481	7.529
Molecular Weight	370	530	600	700	900	1200	1500
Neut. Number	.10	.10	.10	.05	.02	.01	.01
Sap. Number	.3	.3	.2	.2	.2	.1	.1
Carbon %	0	0	0	0	0	.01	.02
Sulphur %	.01	.01	.01	.02	.02	.02	.04
Sligh Oxidation Test	0	0	0	0	1	1	2
Color ASTM (Max.)	1½	1½	1½	2	2	2	2
Dielectric Strength	35,000	35,000	35,000	35,000	35,000	35,000	35,000

ORONITE CHEMICAL COMPANY

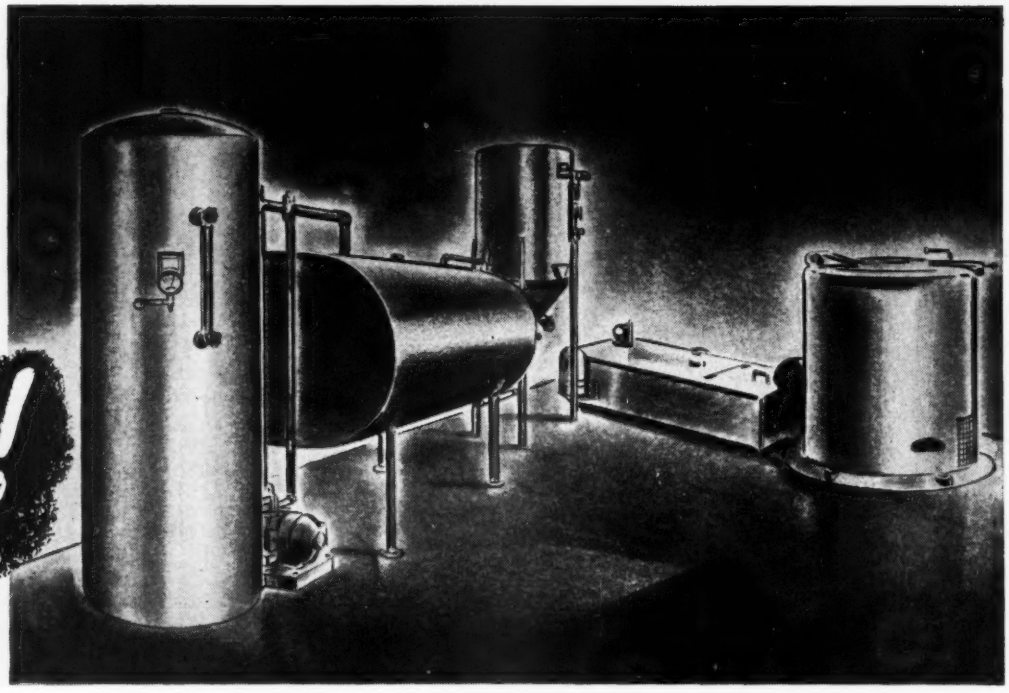
Russ Building, San Francisco 4, California
White-Henry-Stewart Bldg., Seattle 1, Wash.

30 Rockefeller Plaza, New York 20, N.Y.
Standard Oil Bldg., Los Angeles 15, Calif.

A complete oil recovery and reconditioning plant including self-contained motor driven extractor. Many other types of centrifugal equipment available.

EXPORTERS

Most surplus property is available to the export market. Merchandise in short supply is withheld from export and if such items appear in this advertisement, they will be so identified by an asterisk.



SALE!

GOVERNMENT-OWNED SURPLUS

OIL EXTRACTING AND RECONDITIONING EQUIPMENT

When war needs were heaviest, oil extractors and allied centrifugal equipment made vital conservations of metals and cutting oils. Today the emphasis has changed to the extra profits in oil recovery and reconditioning. It is good business to get the equipment you need to install a *complete* oil recovery and reconditioning plant in your own Factory or Machine Shop. Many of these machines are available in standard sizes, makes and models. Simply call your nearest W.A.A. office below, or use the coupon.

GOOD OPPORTUNITY FOR MAKERS AND DEALERS

If you make or sell centrifugal equipment, here is a real opportunity to make extra profits, and keep regular customers satisfied. You can buy back your own make equipment from these surpluses, and recondition or redesign it faster than you can produce new models. Your customers get the needed equipment sooner—and you keep their good will—and profits besides. For further information on purchases of this type, simply write or phone your nearest W.A.A. office below.

MAIL TODAY!

To War Assets Administration: I am interested in Oil Extracting and Reconditioning equipment of the following makes and sizes or Model No.

Make ..... Size or Model No. .....

.....

.....

Please send me information on the following:

☐ Separators ☐ Centrifugal Filters .....

☐ Oil Purifiers ..... Tel. No. .....

Name .....

Firm .....

Address ..... State .....

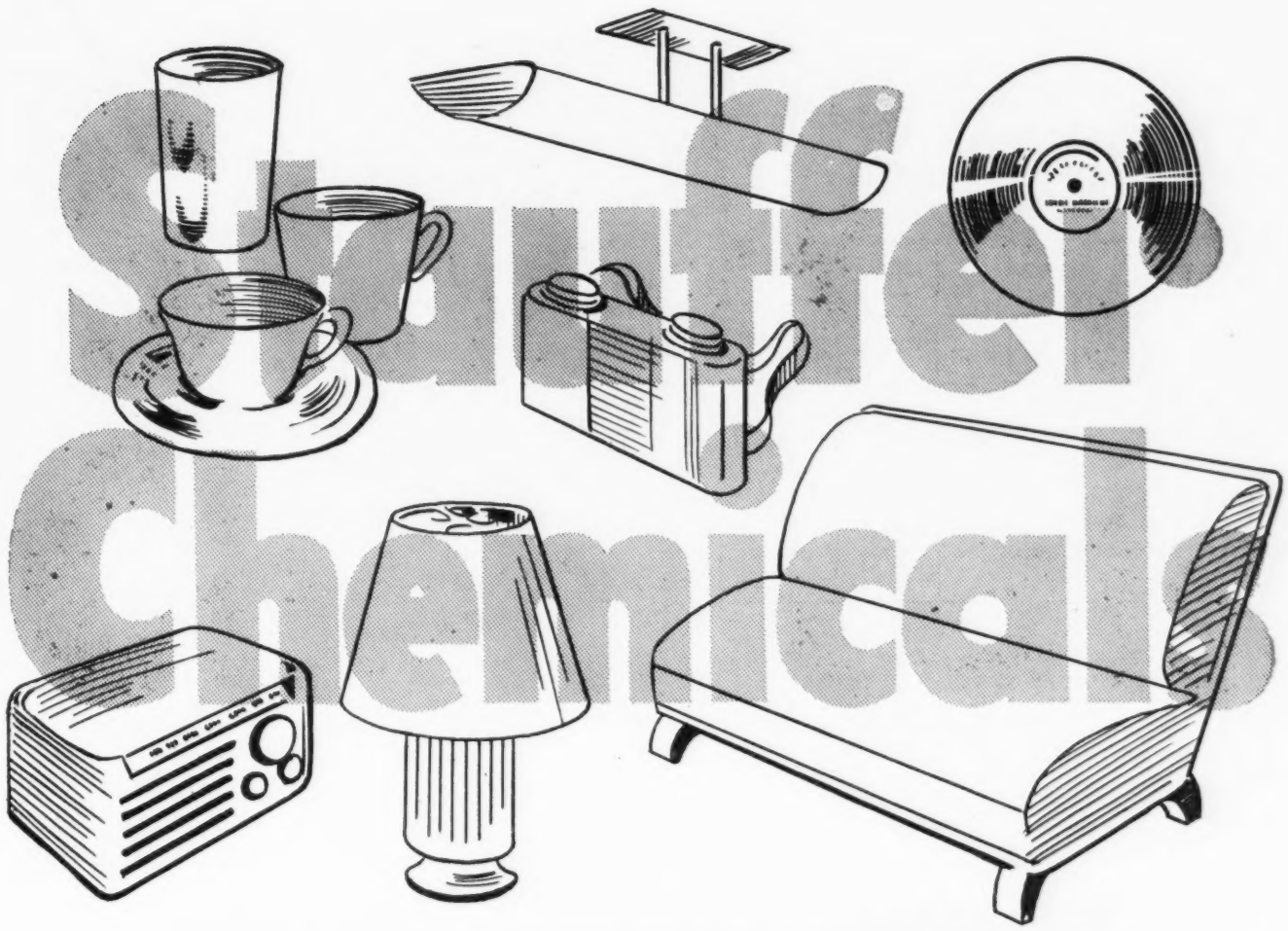
City .....

Although this material has been previously offered to priority claimants, 10% of the merchandise has been reserved to fill any further needs of priority claimants, including Veterans of World War II, who are invited to contact the Regional Office serving their Area with respect to this material.

468-3

WAR ASSETS ADMINISTRATION

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas Denver • Detroit • Forth Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane



FOR THE PLASTICS INDUSTRY

In this "Plastics Age," Stauffer is ready to keep pace with the needs of this "enfant terrible" of the chemical industry. With more than a dozen plants conveniently located in or near every major industrial center of the United States, Stauffer is geared to serve the voracious, growing Plastics Industry with quantity chemicals of uniform quality.

STAUFFER PRODUCTS

*Aluminum Sulphate	Chlorine	Silicon Tetrachloride	Sulphur Chloride
Borax	Citric Acid	Sodium Hydrosulphide	*Superphosphate
Boric Acid	*Copperas	Stripper, Textile	Tartar Emetic
Carbon Bisulphide	Cream of Tartar	Sulphur	Tartaric Acid
Carbon Tetrachloride	Muriatic Acid	Sulphuric Acid	Titanium Tetrachloride
Caustic Soda	Nitric Acid		

(*Items marked with star are sold on West Coast only.)

STAUFFER CHEMICAL COMPANY

Stauffer CHEMICALS SINCE 1885

420 Lexington Avenue, New York 17, N. Y.
221 North LaSalle Street, Chicago 1, Illinois
424 Ohio Bldg., Akron 8, Ohio—Apopka, Fla.
555 South Flower Street, Los Angeles 13, Cal.
636 California Street, San Francisco 8, Cal.
North Portland, Oregon — Houston 2, Texas

More and more manufacturers are switching to HARDESTY fatty acids and their derivatives, following a trend that started when HARDESTY's first shipment was made. This trend was accentuated during the war when HARDESTY products provided many answers to the problems created by shortages of imported raw materials.

Even now, many manufacturers who followed the trend to HARDESTY products simply as a wartime expedient have decided—on the basis of superior performance for less cost—NEVER to go back to high priced imports.

The new trend to HARDESTY is a continuance of the recognition that HARDESTY is a dependable source of supply for stearic acid, red oil, glycerine, fatty acids and their derivatives. Manufacturers have learned to rely upon HARDESTY for quality in every product, uniformity in every shipment and service with every order.

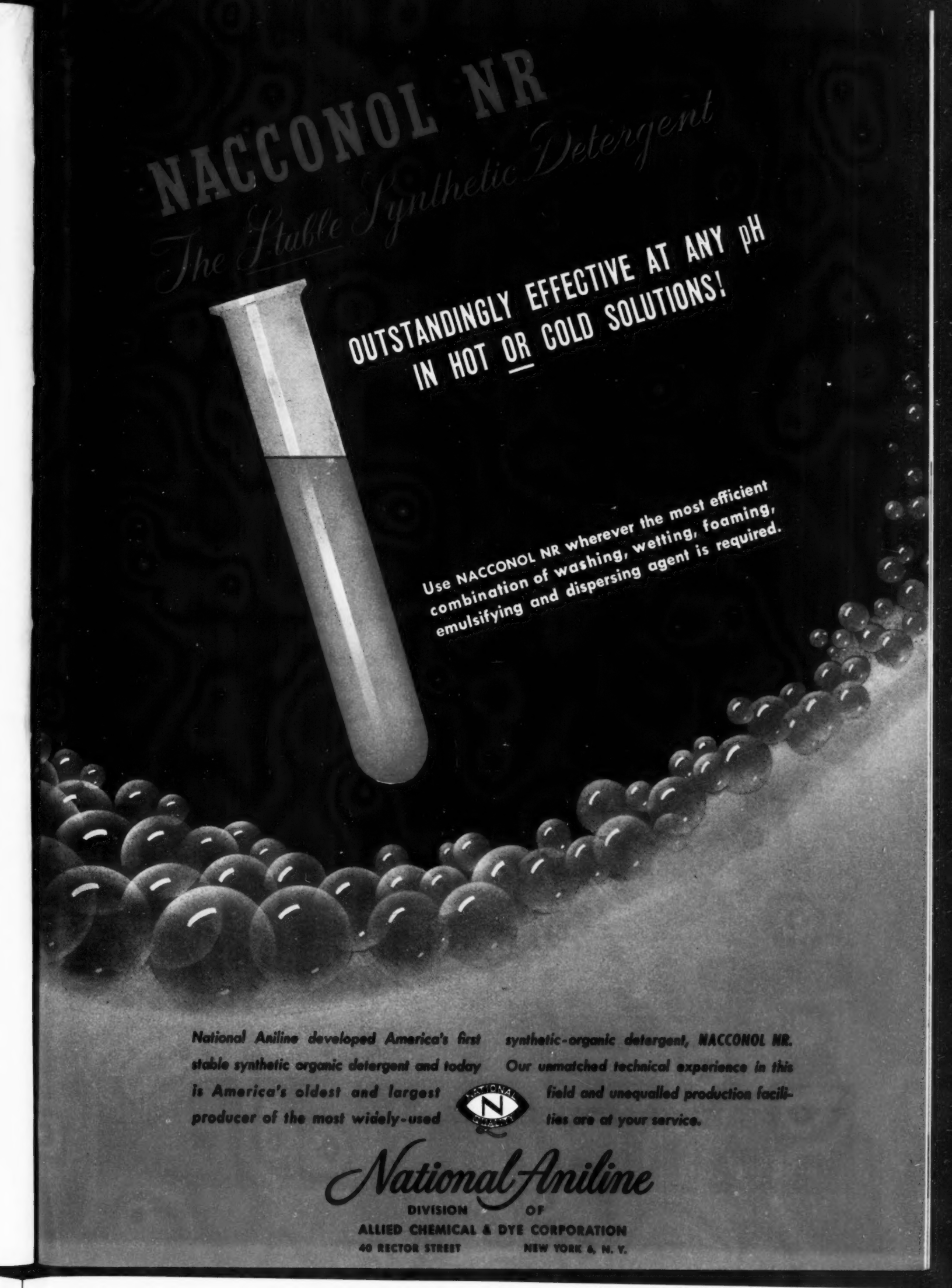
HARDESTY has kept this trend going upward as a result of its never-ending research. Our laboratory technicians—with long experience in the chemistry of fatty acids—are constantly demonstrating to manufacturers how they can save money by first consulting HARDESTY on a new problem.

HARDESTY products are available in sufficient quantities to meet manufacturing schedules and priced to fit cost sheets. If you have a problem—old or new—our technical knowledge and experience are ready to go to work for you.

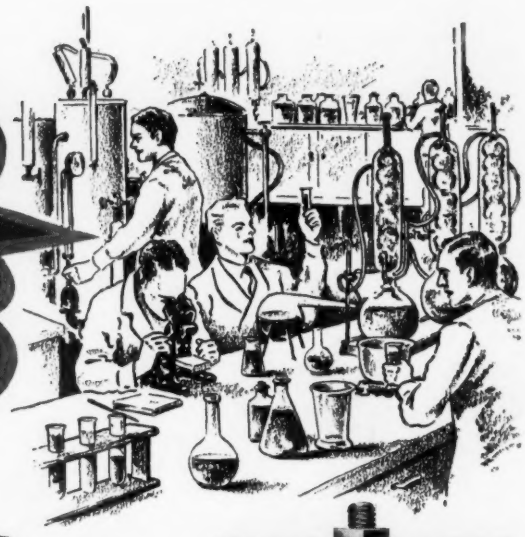
Get in touch with HARDESTY today outlining your particular problem. We'll show you with information and samples why it pays to KEEP IN TOUCH WITH HARDESTY.

W. C. HARDESTY COMPANY, 41 East 42nd Street, New York 17, N. Y. FACTORIES: Dover, Ohio; Los Angeles, Calif.; Toronto, Canda.
HARDESTY PRODUCTS: Stearic Acid • Red Oil • Glycerine • Stearine Pitch • White Oleine • Hydrogenated Fatty Acids • Animal and Vegetable Distilled Fatty Acids.

W·C·
HARDESTY
COMPANY


NACCONOL NR
The Stable Synthetic Detergent
OUTSTANDINGLY EFFECTIVE AT ANY pH
IN HOT OR COLD SOLUTIONS!
Use NACCONOL NR wherever the most efficient combination of washing, wetting, foaming, emulsifying and dispersing agent is required.
National Aniline developed America's first stable synthetic organic detergent and today is America's oldest and largest producer of the most widely-used synthetic-organic detergent, NACCONOL NR. Our unmatched technical experience in this field and unequalled production facilities are at your service.
National Aniline
DIVISION OF
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET NEW YORK 6, N. Y.

VALVES designed for the Chemical & Process Industries



Years ago, when American Industry was still in its infancy, The Wm. Powell Company adopted a definite, farsighted policy . . . to concentrate on making valves only—valves of *every* design, for *every* service in *every* branch of industry.

That is why, today, Powell can supply valves to meet every known flow control requirement in your plant. And, if you have any flow control problems, Powell Engineers will gladly help you solve them.

When writing for catalogs, kindly specify whether you are chiefly interested in Bronze, Iron, Steel or Corrosion-Resistant Valves.*

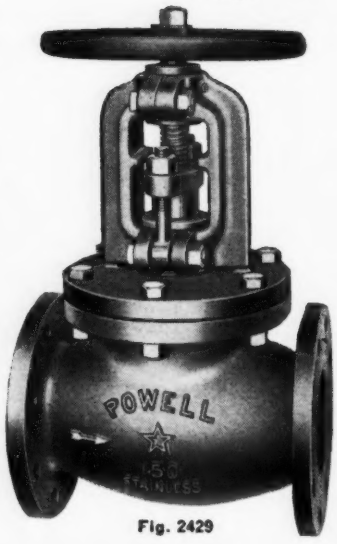


Fig. 2429

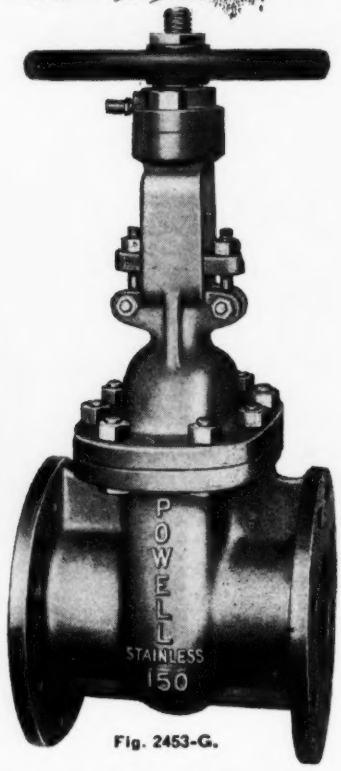


Fig. 2453-G.

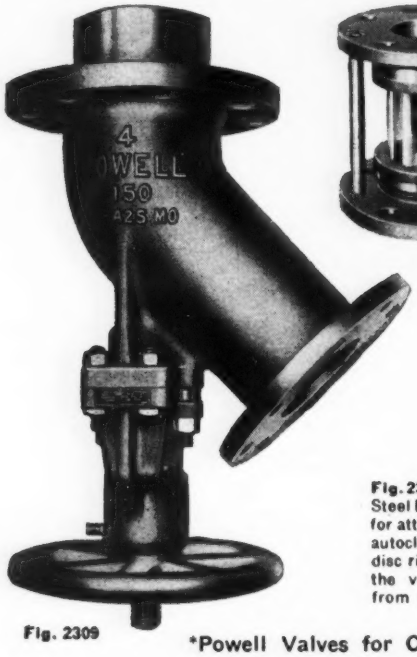


Fig. 2309

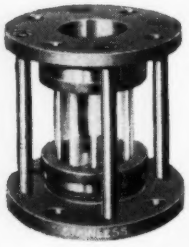


Fig. 2097

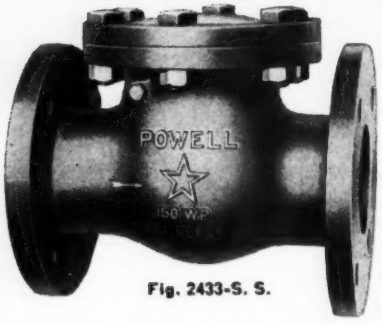


Fig. 2433-S. S.

Fig. 2429—New, 150-pound Stainless Steel Globe Valve. Flanged ends and outside screw rising stem. Designed to permit streamline flow through the body with considerably less turbulence than encountered in ordinary valves and with greatly reduced pressure drop. Sizes, 4" to 12", inclusive.

Fig. 2433-S. S.—150-pound Stainless Steel Swing Check Valve, with flanged ends and bolted flanged cap. Sizes, 2" to 12", inclusive.

Fig. 2453-G.—New, Standard 150-pound Stainless Steel Gate Valve with flanged ends, bolted flanged yoke-bonnet, outside screw rising stem and taper wedge solid disc. Sizes, 2½" to 8", inclusive.

Fig. 2309—150-pound Stainless Steel Flush Bottom Tank Valve, for attaching to metal tanks and autoclaves. In this design, the disc rises into the tank to open the valve. Available in sizes from ¾" to 8", inclusive.

Fig. 2097—Powell Glass Sight Feed, or Look Box. Made with flanged ends only. Available in bronze, iron, steel, pure metals, special alloys, and rubber lined. Pipe sizes, ½" to 6", inclusive.

*Powell Valves for Corrosion Resistance are made in a number of special designs and are available in the widest variety of pure metals and special alloys ever used in making valves.

The Wm. Powell Co., Cincinnati 22, Ohio

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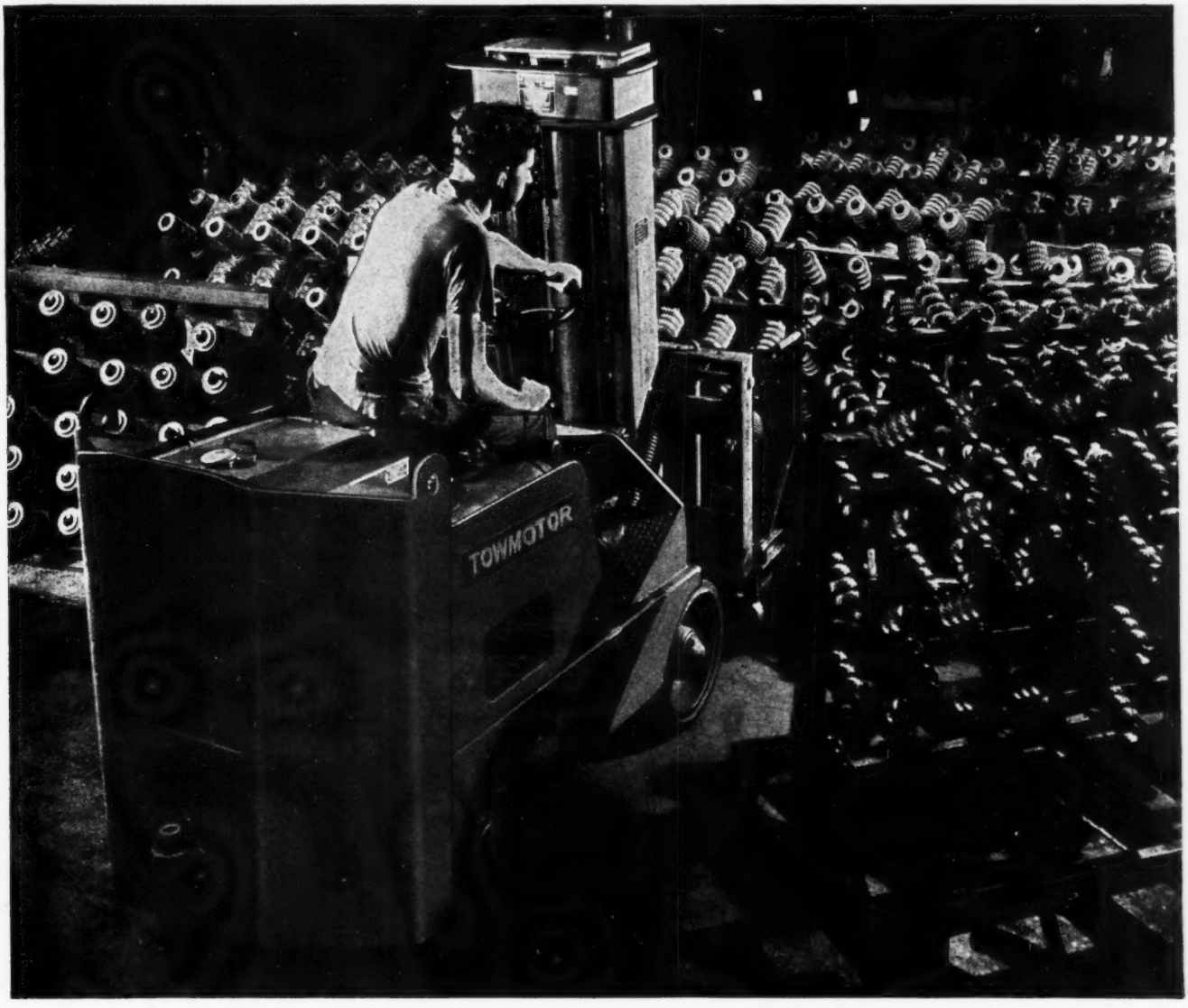
POWELL VALVES



GEARED—TO CAPACITY PRODUCTION

MILLIONS OF GEARS—gears of many sizes and shapes, for a large variety of uses—are produced by Warner Gear Division, Borg-Warner Corporation. Mass production of this sort entails numerous handling problems, many of which are effectively solved by a fleet of eleven Towmotors.

On receiving docks, a single Towmotor handles all types of raw materials including 18-foot bar stock, keeps materials flowing to production departments. In the shop, Towmotors tier 5600-lb. loads three high to triple storage space, provide a simple answer to the perplexing problem of transporting 1200-lb. cyanide pots from heat-treating to storage. One unit often does the work of a ten-man gang.

In the shipping department, two Towmotors load 250,000 lbs. of gears daily, in addition to supplying loads for three interplant trucks. And to Towmotor's record for versatility and capacity can be added economical operation . . . operating costs for each unit total only one-quarter of the operator's wage.

For every handling problem, however unusual, there is an engineered solution . . . a solution based on Towmotor experience and "know-how" gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE. Towmotor Corporation, 1237 East 152nd Street, Cleveland 10, Ohio.

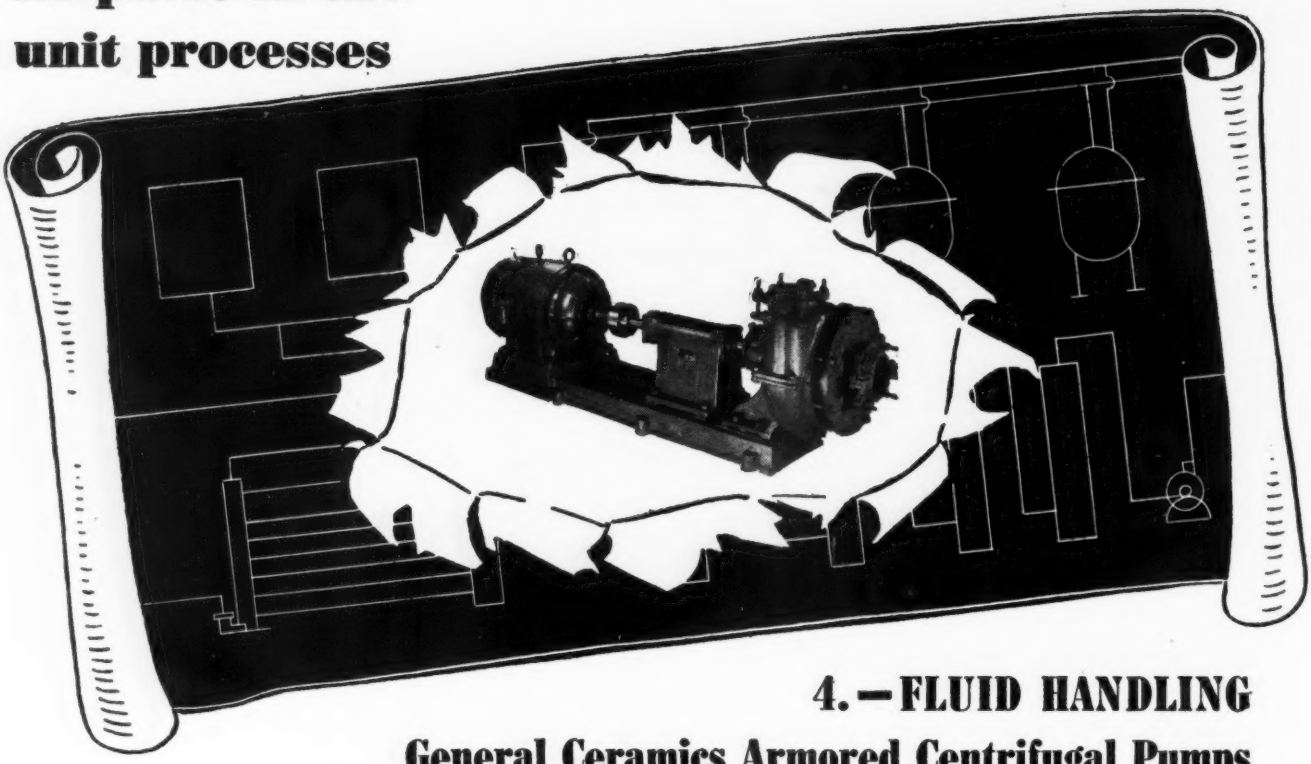
TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

CHEMICAL STONEWARE

its place in the unit processes



4.—FLUID HANDLING

General Ceramics Armored Centrifugal Pumps For Moving Corrosive Liquids

When flowsheets call for the continuous, trouble-free movement of corrosive liquids, it will pay you to investigate the properties of *chemical stoneware pumps* —and the advantages of stoneware pumps designed by *chemical engineers.*

Chemical stoneware is an ideal material for pumps handling highly corrosive acids, bleaching agents, pharmaceuticals, food products, and fine chemicals. Chemical stoneware won't contaminate these liquids; it is not only corrosion resistant, but—with all acids except hydrofluoric—actually *corrosion proof.*

Added to the inherent advantages of the *material,* in General Ceramics chemical stoneware pumps, are design features insuring minimum maintenance, maximum freedom from breakage, and long service life. Outstanding among these features:

- **Complete stoneware "wet end"—corrosive liquids can't contact metal parts.**
- **Cast iron armor—maximum mechanical protection.**
- **Water sealed stuffing box—lengthens shaft and impeller life.**
- **Threaded impeller—Easy maintenance—quick replacement.**

For a full description of Stoneware Centrifugal Pumps send for Bulletin 211, and call on General Ceramics for the help of its chemical engineers on all phases of corrosive liquid handling.

1737

GENERAL CERAMICS AND STEATITE CORPORATION
CHEMICAL EQUIPMENT

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MONTREAL: Canada Cement Bldg. • **TORONTO:** Richardson Agencies, Ltd., 454 King St., West
VANCOUVER, B.C.: Willard Equipment Ltd., 860 Beach Ave.

General Ceramics AND STEATITE CORP.
CHEMICAL EQUIPMENT DIVISION
KEASBEY, NEW JERSEY

In addition to the manufacturing facilities of the Chemical Equipment Division those of the Insulator Division are also available for handling ceramic problems in all branches of industry. General Ceramics & Steatite Corporation is therefore able to offer service covering all industrial applications of ceramic products.

YOU ACCENTUATE THIS POSITIVE

when you

ELIMINATE THIS NEGATIVE

Sales appeal spells $ — and a perfectly-suspended formula spells sales appeal!

KELCO ALGINS insure complete stabilization—eliminate the unsightly settling that often mars the appearance of food, pharmaceutical and other industrial products.

KELCO ALGINS are uniformly effective as STABILIZERS, SUSPENDING AGENTS, EMULSIFIERS, BODYING and THICKENING AGENTS, or HYDROPHILLIC COLLOIDS.

Food and dairy products, tooth paste, textile printing pastes, paper sizing agents, cold water paints, industrial hand lotions — no matter what the stabilizing problem — KELCO ALGINS have proved themselves.

KELCO ALGINS are non-variable, readily adjust themselves to changes of environment. Products of Nature, processed under rigid specifications to produce consistently uniform results, they are free of impurities . . . and surprisingly economical. Consult our Technical Department. They are always at your service. Just write us your intended application.

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KELCO COMPANY

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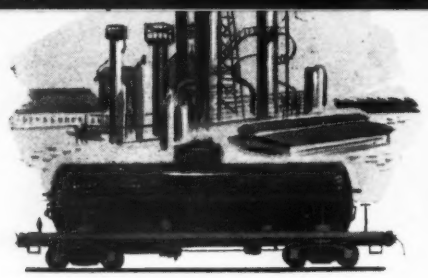
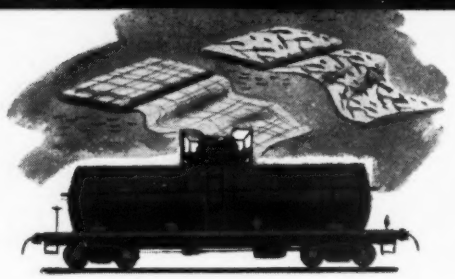


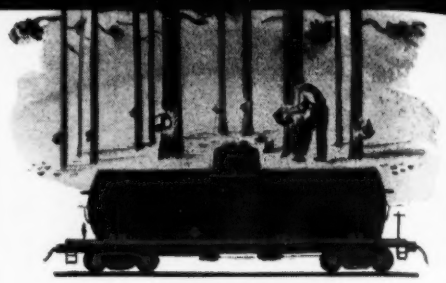
ALCOHOL

Clean, steel car, 6,000 to 10,000 gallon capacity.



CAUSTIC SODA

Heavily insulated steel car, with or without heater coils, 8,000 or 10,000 gallon capacity. Usually specially lined.

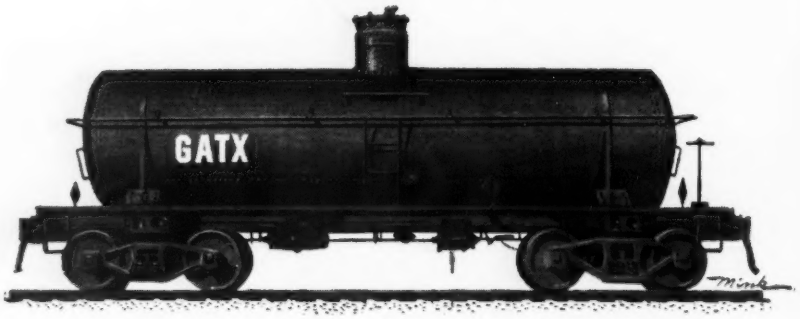


TURPENTINE

Clean steel car; 6,000 to 8,000 gallon capacity.

FOR RENT

TANK CARS



Tank car transportation of liquids in bulk, pioneered by General American has proved its versatility, its efficiency, its economy.

The General American fleet comprises more than 37,000 specialized tank cars . . . 207 different types of tank cars . . . designed for the safe and swift hauling of an almost infinite variety of liquids.

General American's strategically located offices, plants and repair shops keep these tank cars at your service, provide you with precisely the type of tank cars you want, *where* you want them.

• • •

If your problem is the transportation of liquids in bulk, let the nearest General American office help you.

GENERAL AMERICAN TRANSPORTATION CORPORATION

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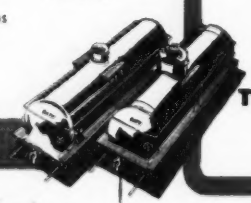
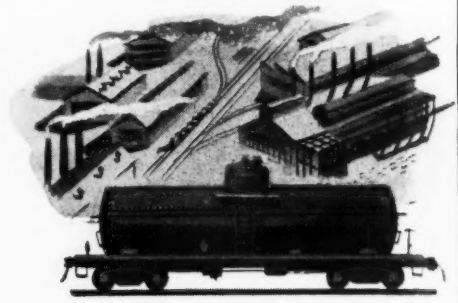
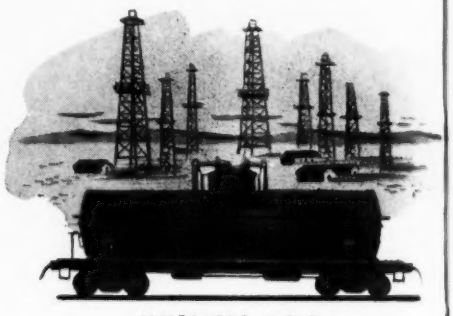


GENERAL AMERICAN TRANSPORTATION CORPORATION CHICAGO



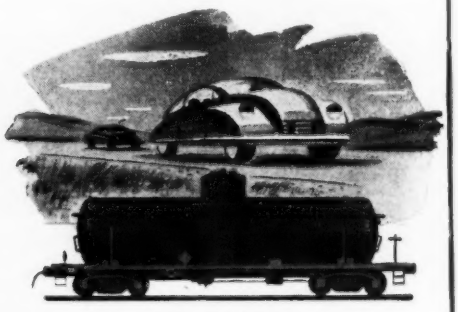
FUEL OIL

Steel car, steam coiled, 8,000 to 12,500 gallon capacity.



MURIATIC ACID

Car lined with pure or synthetic rubber; 8,000 to 10,000 gallon capacity.

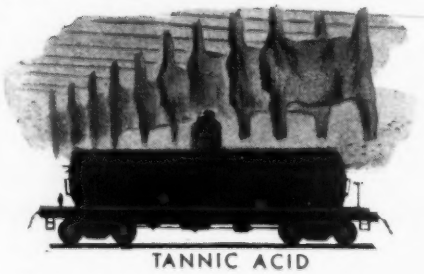


GASOLINE

Clean car, 6,000 to 12,500 gallons; single or multiple compartment

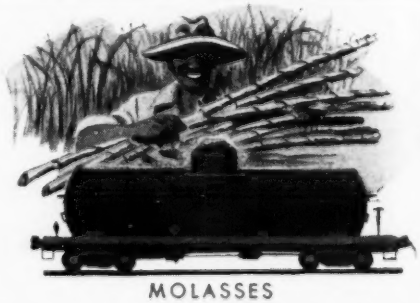
COCONUT OIL

Clean steel car, with steam coils, usually 8,000 gallon capacity.



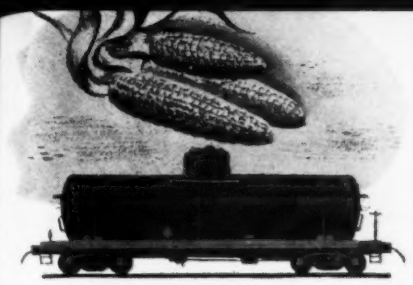
TANNIC ACID

Equipped with brass coils and interior lined with a resinous, plastic or asphaltic material.



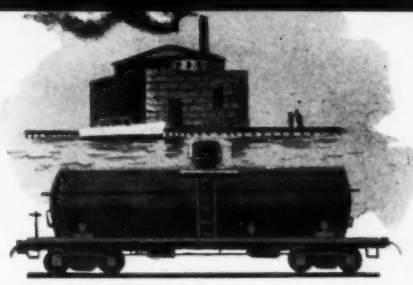
MOLASSES

Steam coiled car with heavy capacity trucks; 8,000 gallon capacity.



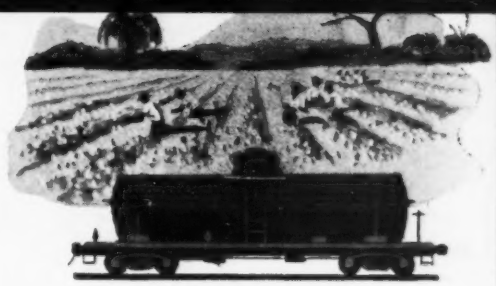
CORN OIL

Clean, steam coiled car.



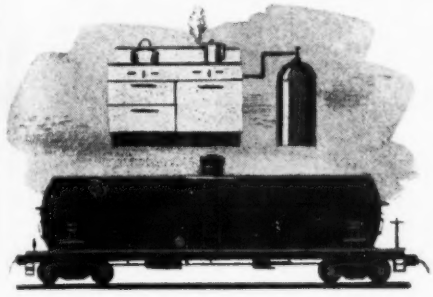
CHLORINE

Insulated, welded car; built to withstand pressure up to 500 pounds; 15 or 30 ton capacity.



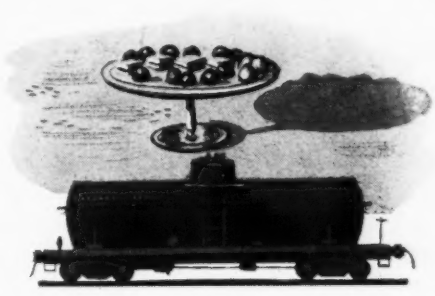
COTTONSEED OIL

Clean, steam coiled car of 8,000 gallon capacity.



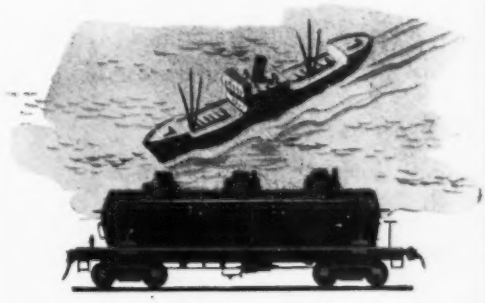
PROPANE

Heavily constructed car, welded and insulated. Built to withstand internal pressures to 300 pounds. Capacity 10,000 to 11,000 gallons.



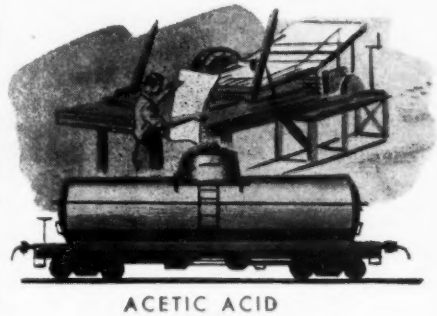
CORN SYRUP UNMIXED

Clean, steam coiled with heavy truck capacity. Usually lined with aluminum paint.



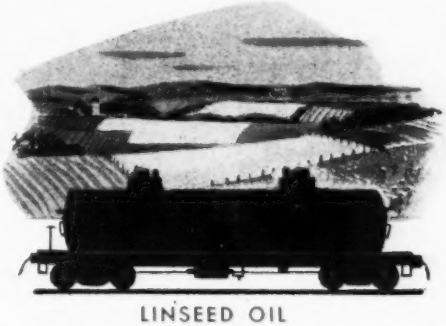
LUBRICATING OIL

Steel car, with steam coils, single or multiple compartment; usually 8,000 gallon capacity.



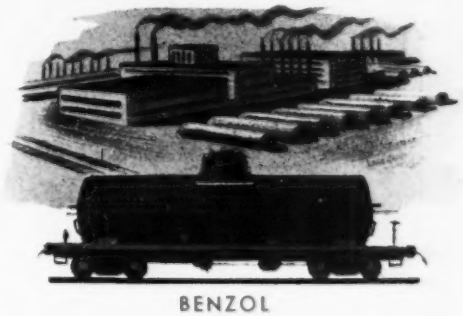
ACETIC ACID

Aluminum Car, 8,000 or 10,000 gallon capacity.



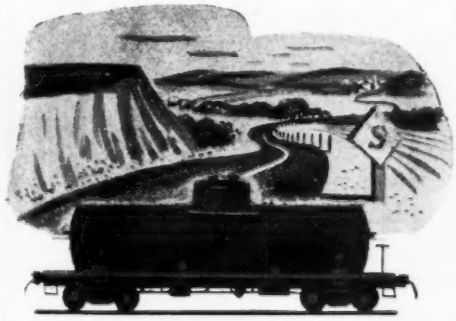
LINSEED OIL

Steel car equipped with steam coils; single or multiple compartment, usually 8,000 gallon capacity.



BENZOL

Clean car, with steam coils; 8,000 to 12,500 gallon capacity.

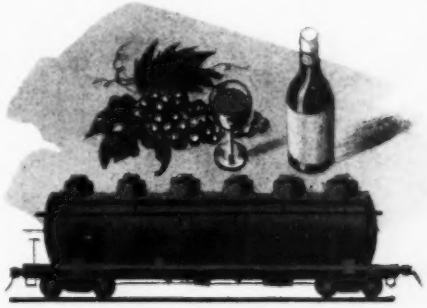


ASPHALT OR TAR

Heavily steam coiled car; with 2 or more inches of insulation; steam jacketed outlet; 8,000 to 10,000 gallon capacity.

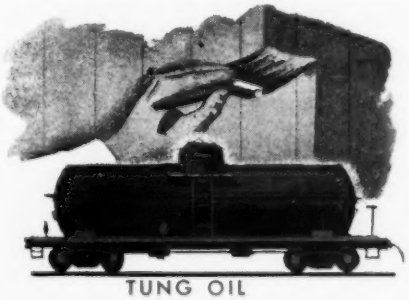
LARD

Clean steam coiled car, usually of 8,000 gallon capacity



WINE

Insulated car with one to six compartments. Interior coated to preserve quality.

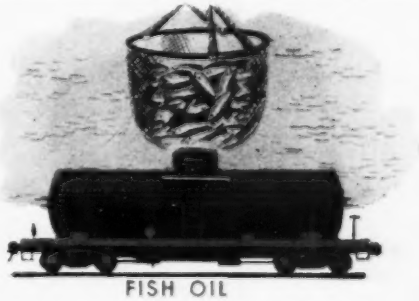


TUNG OIL

Steam coiled steel car, usually of 8,000 gallon capacity.

SULPHURIC ACID

Heavily constructed steel car with heavy truck capacity. Equipped to unload through dome.



FISH OIL

Steel car with steam coils.

Mallinckrodt STANDARDIZED and SPECIAL STEARATES

PRODUCT	Bulk (fl. oz. per lb.)	Metallic Oxide	Acetone Extractable*	Melting Point†	Soluble or Dispersible	Special Characteristics	Uses
Aluminum Stearate Technical M [$Al(OH)_2St$]	50-55	14-15%	6.5-7.5%	190-200° C	In hot chlorinated solvents—$CHCl_3$, CCl_4, etc., mineral oils and waxes, vegetable oils, waxes and turpentine, fatty acids, cyclic solvents—benzine, naphtha, etc., and sulfonated oils. Hot solutions generally form gels on cooling.	High metallic oxide content	1, 8
Aluminum Stearate Technical D [$Al(OH)St_2$]	50-55	8.4-8.7%	6-7%	155-160° C			1, 2, 3, 4, 8
Aluminum Stearate Technical D 5-48	45-50	8.7-9.0%	6-7%	155-160° C		Especially strong gelling action	1
Flatting Agent No. 22	65-70	8.4-8.7%	6-7%	145-150° C		Good flatting action.	3
Aluminum Stearate Fluffy	60-65	8.4-8.7%	6-7%	145-150° C		Similar to Tech D but softer and more bulky.	1, 4, 8
Aluminum Stearate Technical T-D	85-95	7.5-8.0%	12.5-13.5%	125-130° C		Intermediate between Tech D and Tech T, but softer and more bulky than either.	1, 4, 9
Aluminum Stearate Technical T [$AlSt_3$]	60-65	6.0-6.5%	24-25%	105-110° C			1
Ammonium Stearate Technical	30-35	5.5-6.0% (NH_3)	decomposes	decomposes	Soluble in cold water. Decomposes in organic solvents.	A granular, free-flowing product approx. 100% ammonium stearate. Readily loses NH_3 content, leaving water-insoluble stearic acid.	1, 5, 7, 8
Calcium Stearate Technical	45-50	8.8-9.3%	1-2%	145-150° C	No		3, 4, 5, 8
Calcium Stearate Impalpably Powdered	120-130	8.8-9.3%	0.5-1%	145-150° C			3, 4, 5, 7, 8, 10
Magnesium Stearate Impalpably Powdered	105-110	7.5-8.0%	0.5-1%	125-130° C	Partially soluble hot in mineral oils and waxes, vegetable oils, waxes and turpentine, fatty acids.		1, 4, 5, 7, 8, 10
Sodium Stearate Technical	35-40	9.5-10.5%	—	180-185° C	Water, lower alcohols, mineral oils and waxes, fatty acids.		7, 10
Zinc Stearate Technical	130-140	14.0-14.5%	1-2%	112-117° C	Chlorinated solvents—$CHCl_3$, CCl_4, etc., vegetable oils, waxes and turpentine, fatty acids, cyclic solvents—benzine, naphtha, etc.		3, 5, 6, 8
Zinc Stearate U.S.P. XII	120-130	14.0-14.5%	2-2.5%	112-117° C			3, 5, 10

* Extracted with boiling acetone. † Determined in capillary tube.
Alkali salts and water content of stearates (excepting Sodium Stearate Tech.) is limited to 1% and is usually less.

1. Processes involving gel structures.
2. Modifying waxes and wax compositions, plastics, etc.
3. Flatting paints, varnishes and lacquers.
4. Suspending pigments and other solids in liquid media.
5. Releasing agent for molding and casting operations.
6. Manufacture and compounding of rubber and rubber products.
7. Dry lubricant for tabletting and protection of hygroscopic materials.
8. Increasing water repellancy of cement, rope, textiles, paper, etc.
9. Inks.
10. Cosmetics and ointments.

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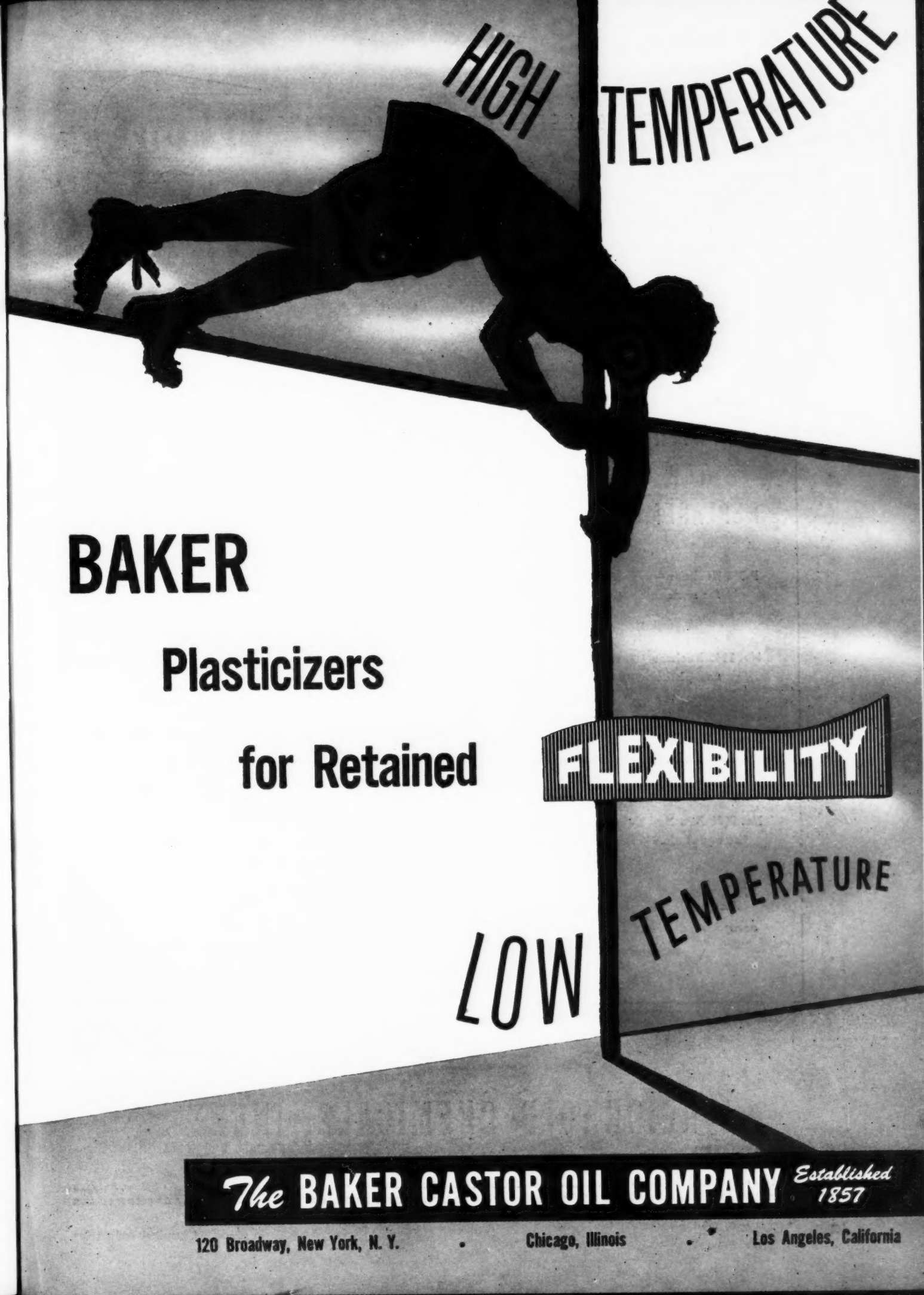
79 Years of Service *to Chemical Users*

Mallinckrodt St., St. Louis 7, Mo. • 72 Gold St., New York 8, N. Y.

CHICAGO • PHILADELPHIA • LOS ANGELES • MONTREAL

UNIFORM • DEPENDABLE • PURITY


HIGH TEMPERATURE
BAKER
Plasticizers
for Retained
FLEXIBILITY
LOW TEMPERATURE
The BAKER CASTOR OIL COMPANY
Established 1857
120 Broadway, New York, N. Y.
Chicago, Illinois
Los Angeles, California

WORLD'S LARGEST PRODUCER OF SYNTHETIC RESINS

RCI

everybody talks about shortages

TAME YOUR TROUBLES WITH THESE TOP QUALITY REPLACEMENT ITEMS

P-500 Beckolin—new oil extender for surface coatings

■

No. 1945 Beckosol—the finest of non-phthalic alkyds

■

Zenith Greens—in many respects better than lead chrome greens

■

No. 5900 Azo Red Toner—practically the equal of 5055 Para-Toner Light

■

And many others on which complete data will be furnished on request.

but RCI does something about them

If you're stymied by quotas and shortages—if production is down and customer complaints are up—the chances are good that RCI can help you back to normal. Because of its matchless experience and wide resources RCI has produced, and is still producing, satisfactory replacement and quota-free items for many scarce colors and resins. Some of these fine developments are listed here. Others are in preparation. For further facts about what RCI is doing to keep its customers in business write direct to the Sales Department in Detroit.

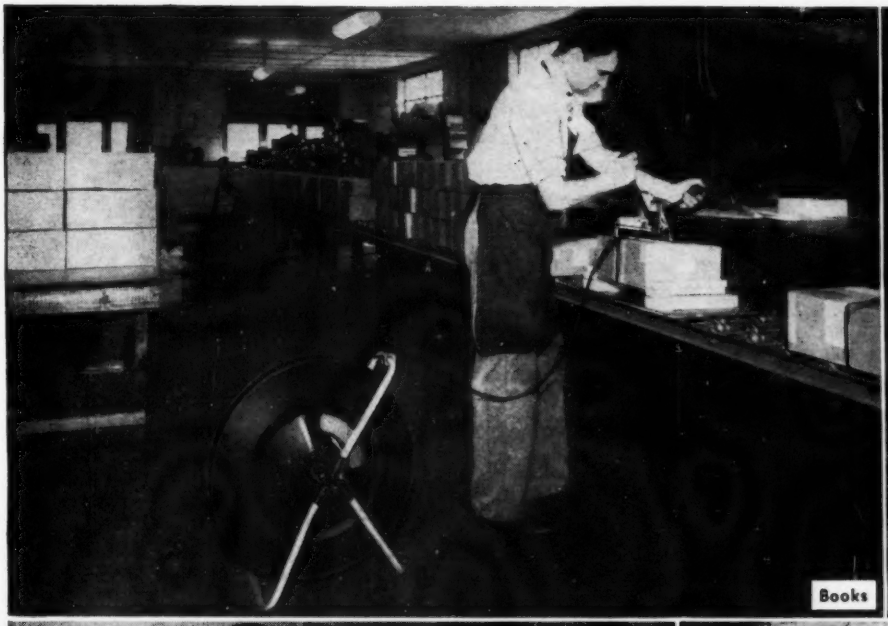
REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit 20, Michigan

Other Plants:

Brooklyn, New York • Elizabeth, New Jersey • South San Francisco, California • Tuscaloosa, Alabama • Liverpool, England • Paris, France • Sydney, Australia

SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • INDUSTRIAL CHEMICALS


Books

Small Machine Parts

Chewing Gum

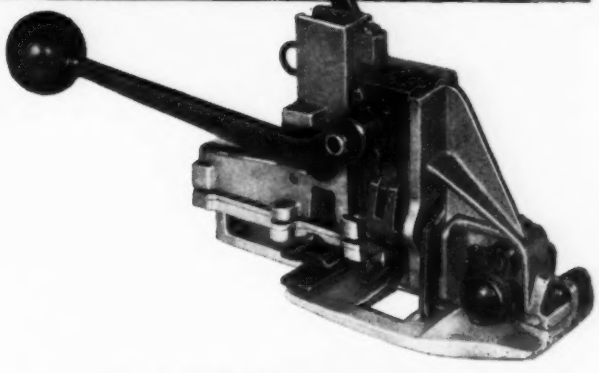
Oleomargarine

for FAST STRAPPING

A-2 TENSIONS-CUTS-SEALS IN ONE OPERATION

Here is *the* strapping machine designed to speed up box strapping operations in your shipping room. Recently, an A-2 strapped 167 wood cases (36"x15"x16") with 3 straps girthwise in 2 hours and 5 minutes. That's speed!

Complete details and descriptive literature on box strapping—heavy duty strapping—carloading, sent on request.

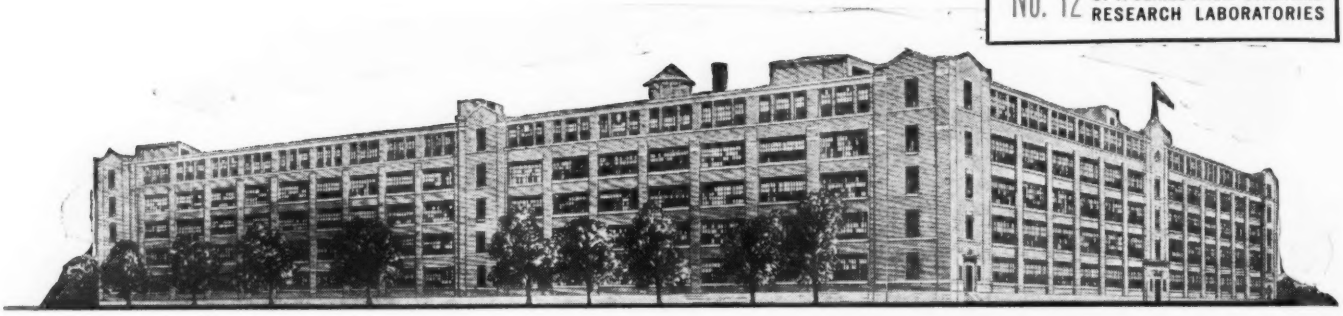


Signode Steel Strapping gives *added protection* necessary to assure damage-free shipment of your boxes, crates, cartons, packages, bundles, skids, or carloadings.

SIGNODE
STEEL STRAPPING

SIGNODE STEEL STRAPPING COMPANY
2662 N. Western Avenue, Chicago 47, Illinois
395 Furman St., Brooklyn 2, N. Y. 481 Bryant St., San Francisco 7, Calif.
Branches in 21 Principal Cities

No. 12 OF A SERIES FROM CYANAMID RESEARCH LABORATORIES



Aero* Glycolonitrile HO-CH_2-CN

New Highly Reactive Intermediate... Alcohol and Nitrile Combined

With the chemical properties of alcohol and nitrile combined, varied application for glycolonitrile is found in the broad fields of organic synthesis — plastics, pharmaceuticals, dyestuffs, photographic chemicals, preparation of important organic intermediates and numerous others.

A representative few of the compounds which can be made are:

Chloracetonitrile Cl-CH_2-CN

Glycolamide HO-CH_2-$CONH_2$

Amino-acetonitriles NH_2-CH_2-CN, $NH(CH_2$-$CN)_2$, $N(CH_2CN)_3$

Anilinoacetonitrile C_6H_5-NH-CH_2-CN

Dimethylaminoacetonitrile $(CH_3)_2N$-CH_2-CN

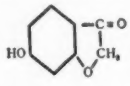
Glycine NH_2-CH_2-COOH

Cyanomethyl esters R-C (:O)-O-CH_2-CN

Dicyanomethyl carbonate $CO(O$-CH_2-$CN)_2$

Cyanomethyl chloroformate Cl-C(:O)-O-CH_2-CN

6—hydroxy-3-(2)-benzofuranone



AERO GLYCOLONITRILE is available in research quantities from our pilot plant in the form of a 50% aqueous solution which has a pH of approximately 2.8 and a specific gravity of 1.042 @ 20°C.

Other Organic Nitrogen Chemicals

Acrylonitrile CH_2=CH-CN

Guanidine compounds NH / H_2N-C-NH_2

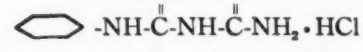
Guanylurea sulfate $(H_2N$-C(:NH)-NH-C(:O)-$NH_2)_2H_2SO_4$

Lactonitrile CH_3-CHOH-CN

Dicyandiamide H_2N-C(:NH)NHCN

Ethylene cyanohydrin HO-CH_2-CH_2-CN

Phenyl biguanide hydrochloride



Consult us if you have a problem in the field of organic nitrogen chemicals.

*Reg. U. S. Pat. Off.

AMERICAN Cyanamid COMPANY

Industrial Chemicals Division

Headquarters For Nitrogen Chemicals

SAMPLES AND TECHNICAL DATA

American Cyanamid Company
Section ON, Synthetic Organic Chemicals Dept.
30 Rockefeller Plaza, New York 20, N. Y.

Gentlemen:

☐ *Send sample of Aero Glycolonitrile* ☐ *Send technical data sheet*

*Name*_____

*Position*_____

*Company*_____

*Address*_____

✻More Phosphate Rock

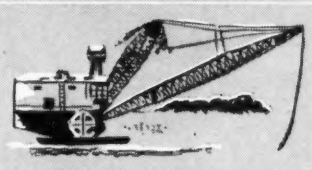
for Industrial and Agricultural Chemicals

International's new Noralyn Mine, now under construction near Bartow, Florida, is designed to produce one million tons of highest grade Phosphate Rock per year when it begins operations in 1947.

An engineering project unique in the industry's experience, the Noralyn Mine is dedicated to the urgent task of producing larger quantities of essential Phosphates to meet the greatly expanded needs of industry and agriculture in America and throughout the world.

Many important metallurgical innovations have been developed by International's engineers for use in the Noralyn Mine which will be the largest phosphate mining operation in the country. Through its research and engineering development program, International has continually improved its processes of mining and refining Phosphate Rock to expand production for increasing market requirements.

✻ NEW NORALYN MINE, BARTOW, FLORIDA



ALL COMMERCIAL GRADES
Florida Pebble Phosphate
and
Tennessee Phosphates

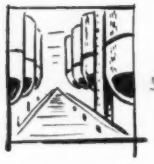
INTERNATIONAL MINERALS & CHEMICAL CORPORATION
General Offices · 20 North Wacker Drive · Chicago 6, Illinois

International MINERALS CHEMICALS
MINERALS AND CHEMICALS

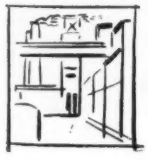
equation

FOR INDUSTRIAL PROGRESS

CSC
FERMENTATION PROCESSES

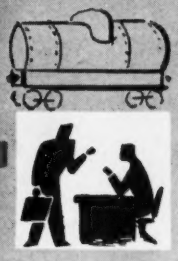


CSC
SYNTHETIC PROCESSES



CSC

ALCOHOLS
ALDEHYDES
AMINES
ESTERS
KETONES
NITROPARAFFINS
PENICILLIN
RIBOFLAVIN



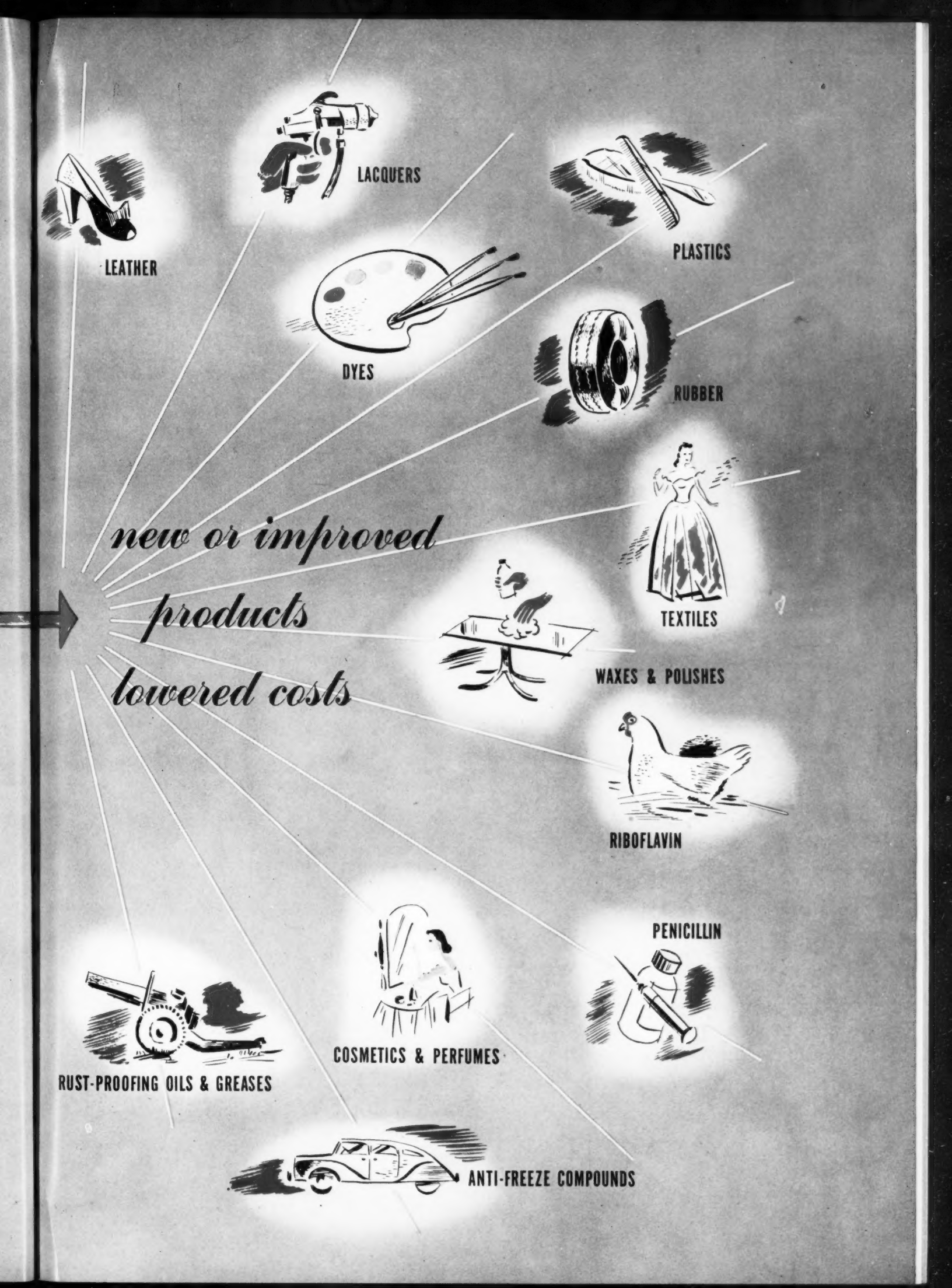
CSC
SERVICE

This equation can produce a profitable reaction in your processes or products.

It is a sound equation based on CSC research and specialized experience in producing chemicals, some of which, and their uses, are listed here.

If you are a user of these chemicals or are a manufacturer of these products, the CSC organization will welcome the chance to place its experience at your service. A call or letter will bring a representative from one of our strategically located sales offices.

COMMERCIAL SOLVENTS
Corporation
17 East 42nd Street, New York 17, N. Y.


LEATHER
LACQUERS
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DYES
RUBBER
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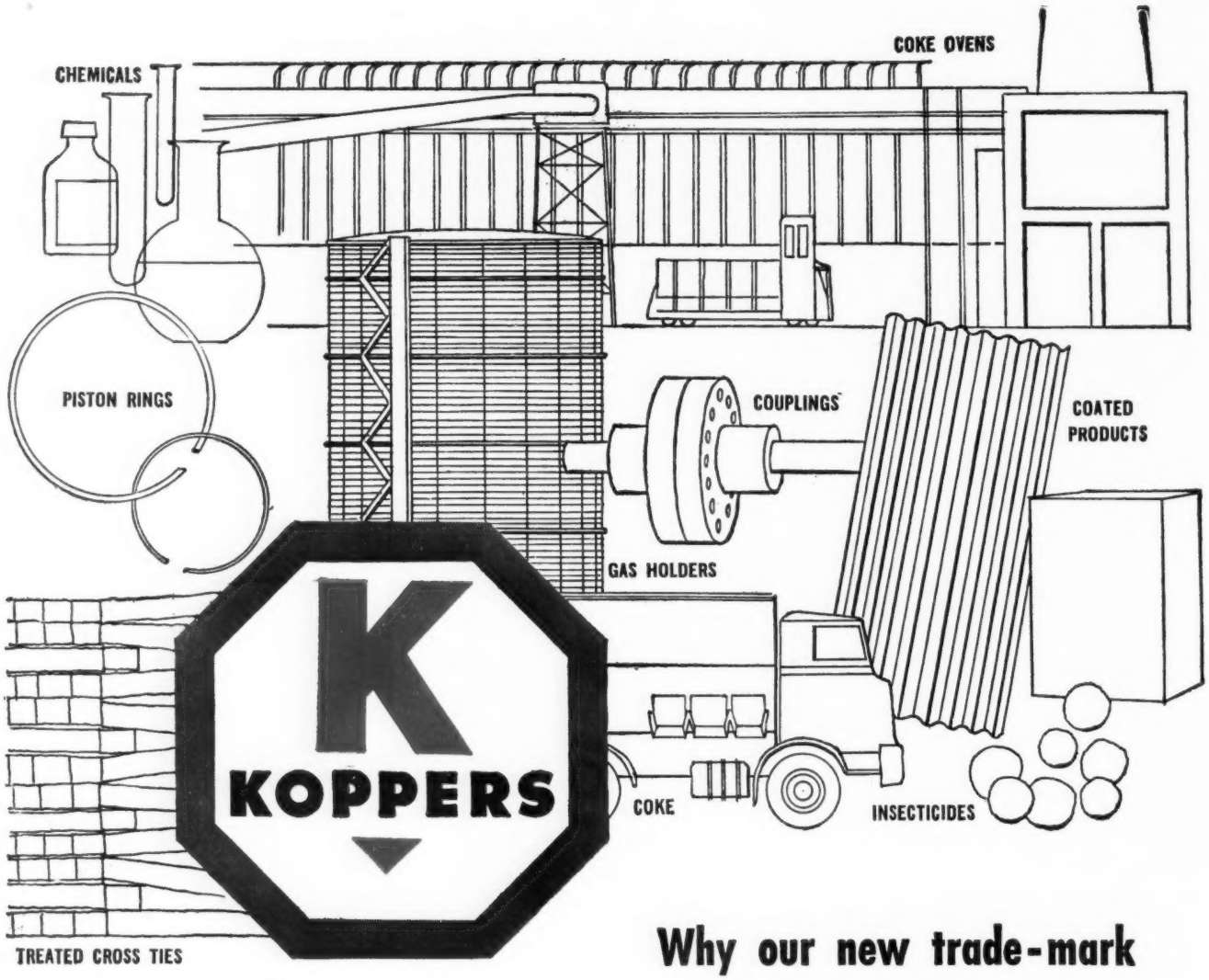
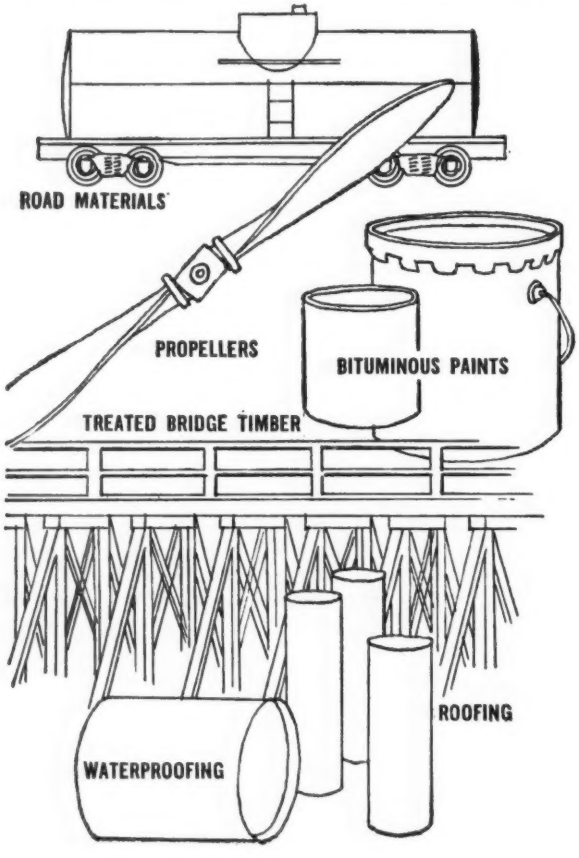
new or improved
products
lowered costs
WAXES & POLISHES
RIBOFLAVIN
PENICILLIN
COSMETICS & PERFUMES
RUST-PROOFING OILS & GREASES
ANTI-FREEZE COMPOUNDS





Why our new trade-mark is important to you

Every day, you place your health, your safety, your children, even your life at the mercy of manufacturers whose products you trust.

Often you do it because of some small mark which doesn't actually say anything in words, but which says volumes in the meanings you read into it.

That's what trade-marks mean to the American people. In effect, the trade-mark says, "Here is a manufacturer who is so sure of this product that he puts his name on it."

That's why our new Koppers trade-mark is important to you.

There are dozens of Koppers products; there will be dozens more as opportunities expand in the rapidly growing chemical field.

Often you will not be able to see the Koppers label on those products—you can't see it, for example, on road paving material or on a bottle of medicine—but the roadbuilder sees it and the medicine maker sees it, and their confidence in it is your safeguard.

Koppers also is well known as a dependable source for many other products and services which we furnish directly, such as the design and construction of coke ovens, roofing material, piston rings, couplings, propellers for your private plane, coke for your furnace, moth balls for your clothes, paints, pressure-treated wood and scores of others.—Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pa.

KOPPERS—THE INDUSTRY THAT SERVES ALL INDUSTRY

SULFRAMIN

A SYNTHETIC ORGANIC DETERGENT THAT IS EFFECTIVE EVEN IN DILUTIONS OF 1 to 10,000

Of special interest to manufacturers of dyeing assistants, tanning specialties, laundry detergents, and general cleaners.

SULFRAMIN DT and SULFRAMIN LW (Powder) Powerful synthetic detergents and foaming agents unsurpassed wherever hard water presents a problem. LW has a higher lauric content, and consequently is preferred when used in water colder than 50° C. Textile processors, manufacturers of dyeing assistants, tanning specialties, bath preparations and laundry detergents use either type, depending upon the temperature of the solution. LW is recommended for automotive cleansers since cold water is commonly used for car washing.

SULFRAMIN DH (Paste) A concentrated, slightly alkaline detergent offering great money value as an all around boil off compound. It is adaptable to the manufacture of various scouring, cleansing and dyeing assistants; and is usable under any water conditions.

SULFRAMIN DT (Paste) A strictly neutral, synthetic detergent, with good wetting qualities and high resistance to hard water. Manufacturers of dyeing assistants, and textile processors, use it principally in scouring and dyeing preparations compounded to function wherever alkaline solutions are to be avoided.

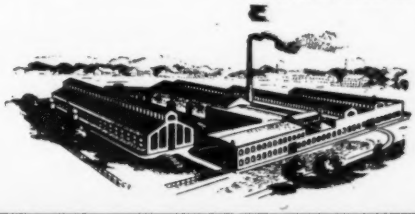
SULFRAMIN DR A neutral compound of high wetting and scouring qualities, having the appearance of a clear, sulphonated oil. It is immediately soluble in hot or cold water, and is therefore an ideal dyeing assistant. It can be employed advantageously as a straight product or in conjunction with various sulphonated oils. It lends itself ideally to the compounding of shampoos, liquid soap, and liquid cleansers.

SULFRAMIN P A powerful built-up detergent which is invaluable in the preparation of household detergents and cleaners. It is particularly efficient in washing machines, packaged laundry detergents, and general cleaners.

SULFRAMIN DHL A clear, leveling agent having the appearance of a sulphonated oil; and suitable for solving your most vexing dyeing problems. It has powerful leveling and penetrating qualities, and assures complete satisfaction in the processing of rayon and acetate fabrics. DHL also lends itself ideally to compounding; and is used extensively in the tanning industries for wetting-back applications.

SULFRAMIN N This is a non-foaming wetting agent, having the appearance of a heavy paste. Although of radically different chemical structure, Sulframin N shares many of the advantages inherent in many of the other Sulframin products. Its strongest feature is its complete immunity to the effects of inorganic acids and alkalies. Consequently, it is preferred in the processing of wool, such as in carbonizing, in dyeing, etc. Not only is Sulframin N an outstanding leveling agent; it can also be safely employed with any amount of alkali.

ULTRAPONE A liquid emulsifying agent, especially useful in water-in-oil emulsions, that is readily dispersible in water, and soluble in all organic compounds; such as hydrocarbons, alcohols, esters, etc. Formulated to lend greater cleaning power to naphtha solutions, Ultrapone is particularly valuable when used in dry-cleansing detergents; adhesive emulsions; and in the manufacture of many cosmetics.



ULTRA CHEMICAL WORKS, Inc.

• PATERSON, N. J. • IN CANADA . . . Delta Chemical Company, Brantford, Ontario

• CHICAGO, ILL. • IN MEXICO . . . Icon, S. A., Mexico, D. F.

4 VERSATILE VARNISH RESINS... Back on the job!

In the past months, many varnish-makers have "rediscovered" these four veteran varnish resins. Immediately available in any desired quantity, they can be used with a wide range of oils to produce tough, durable varnish, enamel, or paint films. Write or phone U. S. Industrial Chemicals, Inc., for samples and specifications.

AROCHEM 335

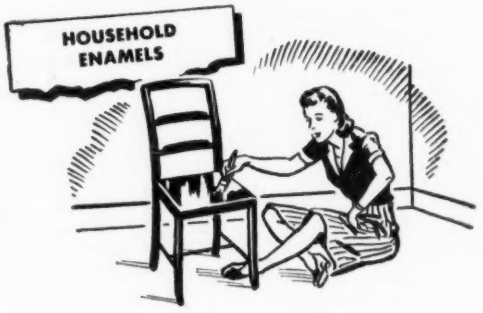
This modified phenolic resin works equally well with most oils in rubbing varnishes, implement, and machinery finishes, structural primers, etc. AROCHEM 335 kettles easily, has good solubility and promotes rapid bodying and hardening. Use where minimum after-yellowing is important.

AROCHEM 365

Good chemical resistance and low cost characterize this modified phenolic resin, widely used in floor varnishes, colored utility enamels, chassis enamels, etc. AROCHEM 365 offers high gloss and alkali resistance, short tack-free time, and good overnight hardness.

AROCHEM 603

Developed for good performance with the "soft" oils, AROCHEM 603 is a non-phenolic resin which yields fast-drying vehicles and films with good color retention. Especially adaptable for "white" formulations. Varnishes made with it body very fast. Recommended for porch and deck paints, quick-drying enamels, tin decorating finishes, etc.



AROCHEM 607

Similar to AROCHEM 603, but higher in synthetic condensate content, this resin also has a higher melting point and will consequently body and dry faster. Color retention and durability are further improved.

U.S. INDUSTRIAL CHEMICALS, INC.
60 East 42nd Street, New York 17, N. Y.

NEVILLE

Nevillac OA Plasticizer

Specifications and Properties

Sp. Gr. @ 30° 15.6°C.	0.980 to 1.00
Viscosity (Gardner-Holdt)	W (average) @ 25°C
Distillation by volume	Essentially between 300°C and 375°C
Max. % off @ 300°C.	5%
Refractive Index @ 20°C.	1.5355
Molecular Weight	230
Odor	Sweet, Characteristic
Color	Amber
Color Retention	Good

Fields of Use

Adhesives of the waterproof, optical, shoe, packaging and pressure sensitive types;

Paper coatings both waterproof and greaseproof and for ordnance wrap;

Paints and varnishes including laminating varnishes, printing and duplicating inks;

Artificial leather and leather finishes;

Raincoats;

As a plasticizer for ethyl cellulose in lacquers, plastics and stripping compounds.

THIS new plasticizer is an alkylated phenol and has a wide range of solubilities and compatibilities. It is soluble in almost all liquids except water and glycerol. It is compatible with most synthetic resins including cellulose esters and ethers (nitrocellulose, ethylcellulose, cellulose acetate, etc.), vinyl acetate, vinyl butyral, zein, nylon, and partly compatible with vinyl acetate and chloride copolymer.

Being an alkylated phenol, Nevillac OA undergoes typical reactions. For instance, with formaldehyde, oil-soluble phenolic resins are produced which can be formulated as such in varnishes, or can be used in fortifying rosin, rosin esters, alkyd resins and established types of phenolic resins.

Write for gratis sample and further information on Nevillac OA for your particular application.

THE NEVILLE COMPANY

PITTSBURGH, 25, PA.

Chemicals for the Nation's Vital Industries

BENZOL • TOLUOL • XYLOL • TOLLAC • NEVSOL • CRUDE COAL TAR SOLVENTS
HI-FLASH SOLVENTS • COUMARONE INDENE RESINS • PHENOTHIAZINE • TAR PAINTS
RUBBER COMPOUNDING MATERIALS • WIRE ENAMEL THINNERS • DIBUTYL PHTHALATE
RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

A-21

Wyandotte invests

Twenty-five million dollars . . . in an expansion program designed to help meet ever-increasing demands for industrial chemicals.

It is an investment founded upon faith—faith in the American system of free enterprise and in the continued greatness of this nation.

This program, already begun, is scheduled to be completed within eighteen months. It will greatly increase Wyandotte's capacity to produce calcium carbonate, chlorine and soda ash. Improvements in the method of processing caustic soda will also increase production of this vital material.

Included in the plans are new plants for the manufacture of glycol and synthetic detergents. The erection of the glycol and synthetic detergent plants will mark a major move by Wyandotte into the field of organic chemicals.

In addition to the huge construction project, Wyandotte is enlarging its sales force, its research, technical and engineering staffs—the better to meet customer needs.

Wyandotte will continue—as it has throughout the period of shortages—to allocate its production fairly to its regular customers at all times. Meanwhile, Wyandotte looks forward to the day when all requirements can be met promptly and entirely.

Wyandotte REG. U. S. PAT. OFF. *OFFICES IN PRINCIPAL CITIES*

WYANDOTTE CHEMICALS CORPORATION • MICHIGAN ALKALI DIVISION • WYANDOTTE, MICHIGAN

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine
Hydrogen • Sodium Zincates • Aromatic Intermediates • Dry Ice • Other Organic and Inorganic Chemicals

A NEW ERA IN INSECT CONTROL

VELSICOL 1068

MANY TIMES MORE POWERFUL THAN DDT

Authoritative tests prove that VELSICOL 1068 is from 3 to 5 times as effective as DDT against the cockroach, the fly, the grasshopper, the squash bug, the pea aphid, the spirea aphid, and the Colorado potato beetle larva. Tests in progress at several leading Universities and at other experimental stations, indicate the outstanding superiority of VELSICOL 1068 against a wide variety of destructive pests not considered here.*

In addition to the superlative killing power of VELSICOL 1068, this toxicant exhibits prolonged residual activity, and is completely soluble in all commonly used solvents, remaining in stable solution at all atmospheric temperatures.

It can be stated now without gainsaying that this product of American chemical research sets new standards of performance, opens a new era in insect control.

To obtain latest data on VELSICOL 1068 see that your name is put on our mailing list. VELSICOL 1068 is available as a 20% concentration in highly refined kerosene, and in Technical Grade, 90% purity.

*NAMES FURNISHED ON REQUEST

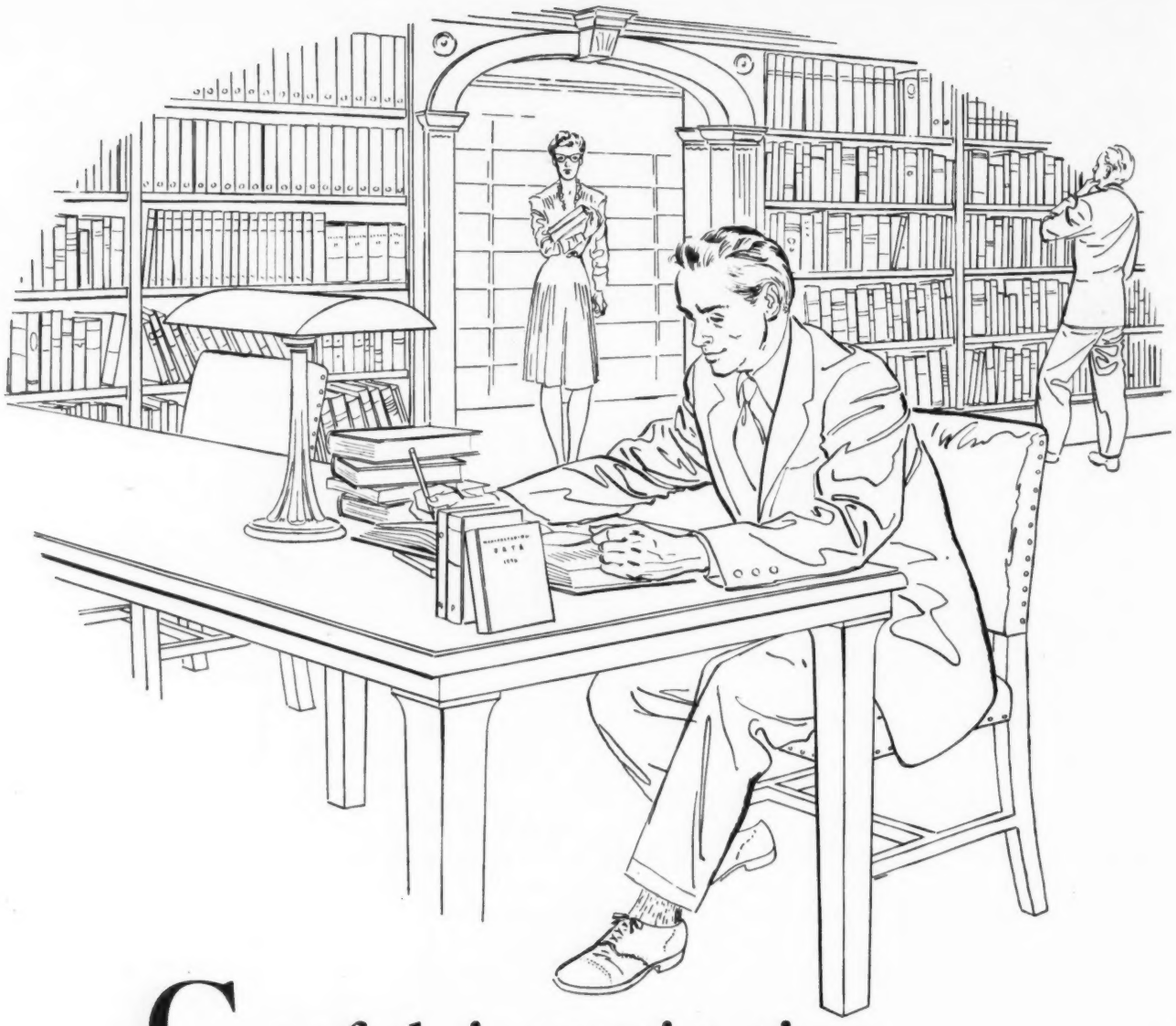
"1068"—U. S. PATENTS PENDING

VELSICOL Corporation

Manufacturers of: Insect Toxicants • Synthetic Resins • Coresin Core Oils • Aromatic Solvents

General Offices: 120 E. Pearson St. • Chicago 11, Illinois

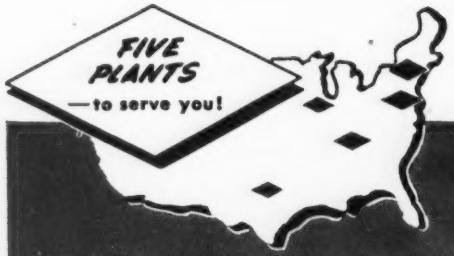
Branch Offices: 11 Park Place, New York 7, N. Y. • 408 Boulevard Bldg., Detroit 2, Mich. • 1900 Euclid Avenue, Cleveland, Ohio



Careful investigation

inevitably reveals the high quality of

STANDARD SILICATES



Grades and types for all classes of service

Plants at Cincinnati • Jersey City
Lockport, N. Y. • Marseilles, Ill.
Dallas, Texas

DIAMOND ALKALI COMPANY

Standard Silicate Division

General Offices: PITTSBURGH, PA.

INDOIL
CHEMICAL PRODUCTS

INDOIL PETROLEUM SULFONATES

A series of high molecular weight sulfonates for non-detergent uses

AVERAGE COMPOSITION

Average Composition Weight %	GRADE						
	AA Purified	AA*	A* Purified	A*	B Purified	B	T
Sodium sulfonate	47	56	44	53	43	36	50
Mineral oil	46	21	47	26	47	38	13
Water	5	16	7	14	4.8	18	29
Salt (Na_2SO_4)	1.8	5.1	1.8	5.1	5.0	6	6
Free alkali as NaOH	0.2	1.9	0.2	1.9	0.2	2	2

PROPERTIES

Properties	GRADE						
	AA Purified	AA*	A** Purified	A*	B Purified	B	T
Combining wt. of acid	430	430	430	430	490	490	400
Solubility in water Least (1) most (4)	3	3	2	2	1	1	4
Forms oil water (o/w) or water/oil (w/o) emulsions	o/w	o/w	o/w	o/w	w/o	w/o	o/w

USES

Uses	GRADES						
	AA Purified	AA*	A** Purified	A*	B Purified	B	T
Emulsifying agents	X	X	X	X	—	—	X
Solubilizing, wetting and dispersion agents	X	X	X	X	X	X	X
Plasticizers	X	X	X	X	—	—	—
Rust preventives	X	X	X	X	X	—	—
De-inking compositions	—	—	—	—	—	X	—
Fat splitting	—	—	—	—	—	X	X
Soluble oils	X	X	X	X	—	—	—

*In many uses the higher sulfonate content of these grades outweighs the lower salt and alkali content of the purified grades.

**Formulations using Sulfonate A emulsify somewhat less readily in hard water than those using Sulfonate AA.

These products are viscous oil-soluble liquids and are available in barrels or tank cars f.o.b. Whiting, Indiana.

The uses shown above are illustrative—many other applications have been made in diverse fields. The hydrocarbon structure of these various sulfonates is not identical, giving minor differences in results in various uses or formulations, which makes specific comparison of samples desirable before selecting grade for commercial use.

Also Available: Hydrocarbons — Bulletin 10. INDOPOL Polybutenes — Bulletin 12. INDONEX Rubber Plasticizers—Bulletins 13 and 13A.

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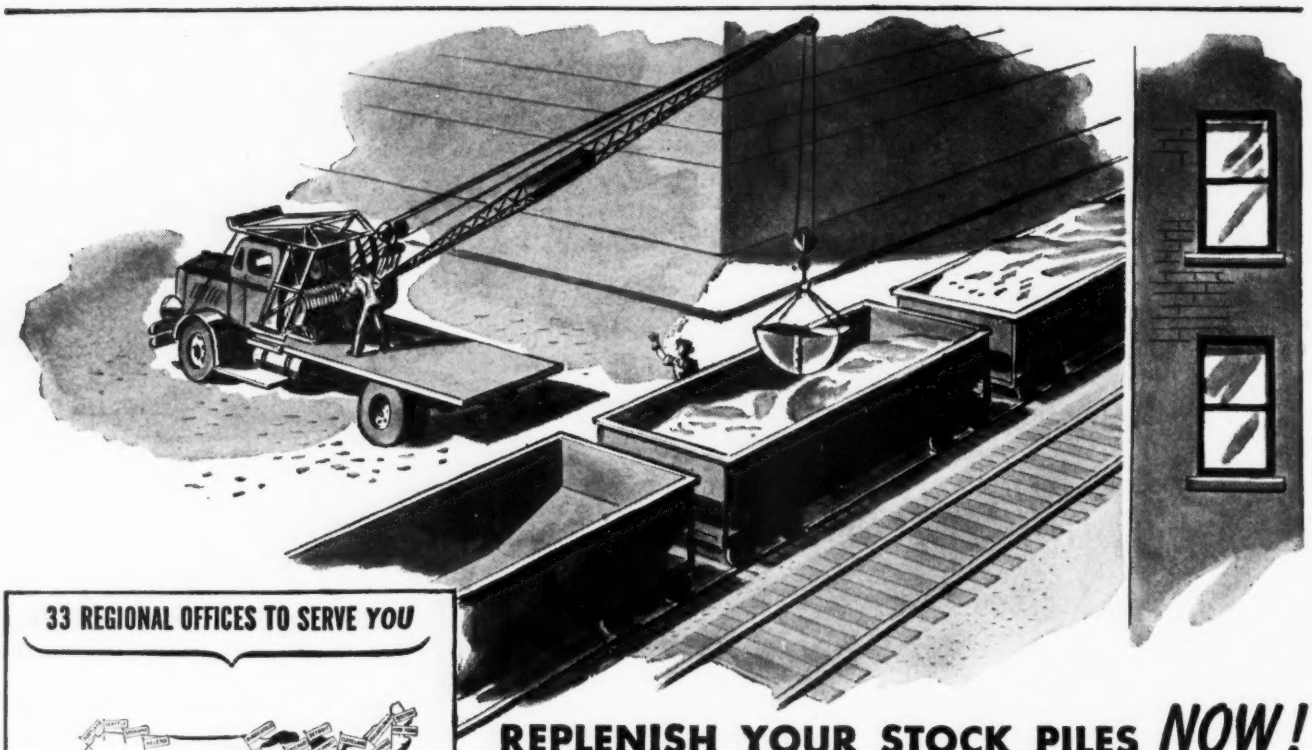

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NEVER again will there be similar opportunity to obtain standard and special specification industrial chemicals at such savings.

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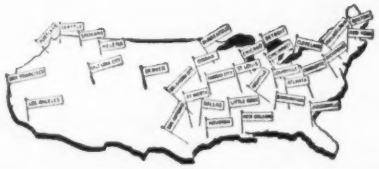
33 REGIONAL OFFICES TO SERVE *YOU*



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- Methyl bromide
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- Activated charcoal
- Silica gel
- Calcium chloride
- Strontium oxides
- Synthetic Rubber (Neoprene)
- Dimethylaniline
- Copper naphthenate
- Synthetic & natural glues
- Printing inks (black & colors)
- and most other chemicals

EXPORTERS:

Most surplus property is available to the export market. Merchandise in short supply is withheld from export and if such items appear in this advertisement, they will be so identified by an asterisk.

FREE FACTS

Mail Coupon Today

War Assets Administration (address nearest Regional Office)

Please supply without obligation, prices, available quantities and locations of items written in below:

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(Describe item wanted)

Name.....

Firm.....

Address.....

City.....Phone..... 155-4

All chemicals are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

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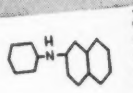
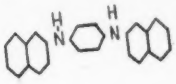
has available for sale these organic chemicals



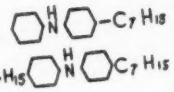
Phenyl B Naphthyl Amine

Distilled—Available in commercial quantities
M. P. 107°
Purity 99.5%
Commercial—Available in commercial quantities
M. P. 106°
Purity 98.0%



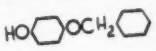
Di B Naphthyl p Phenylene Diamine

Available in commercial quantities
M. P. 230° C
Purity 98%



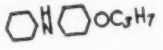
Mixed Mono-and Diheptyl Diphenyl Amines

Available in commercial quantities
Distillation range—145-245
(3.0 mm)
Purity 98%



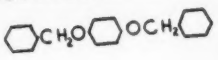
Monobenzyl Ether of Hydroquinone

Available in commercial quantities
M. P. 113°
Purity 90%



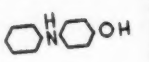
Isopropoxy Diphenyl Amine

Available in commercial quantities
M. P. 78°
Purity 92% min.



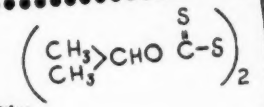
Dibenzyl Ether of Hydroquinone

Available in Pilot Plant quantities
M. P. 119°
Purity 85%



p Hydroxy Diphenyl Amine

Available in commercial quantities
M. P. 15°
Purity 92%

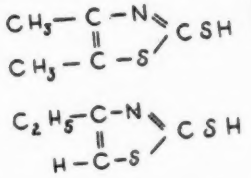


Di Isopropyl Dixanthogen

Available in commercial quantities
M. P. 52°
Purity 98%

N-Nitroso Diphenyl Amine

Available in commercial quantities
M. P. 62°
Purity 97%



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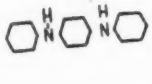
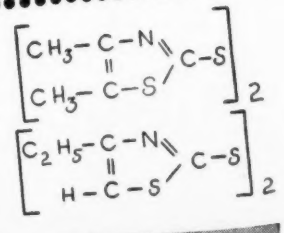
Available in commercial quantities
M. P. 136-153°
Purity Approximately 85% dimethyl and 15% ethyl mercaptothiazoles



Diphenyl p Phenylene Diamine

Available in commercial quantities
M. P. 144°
Purity 92%



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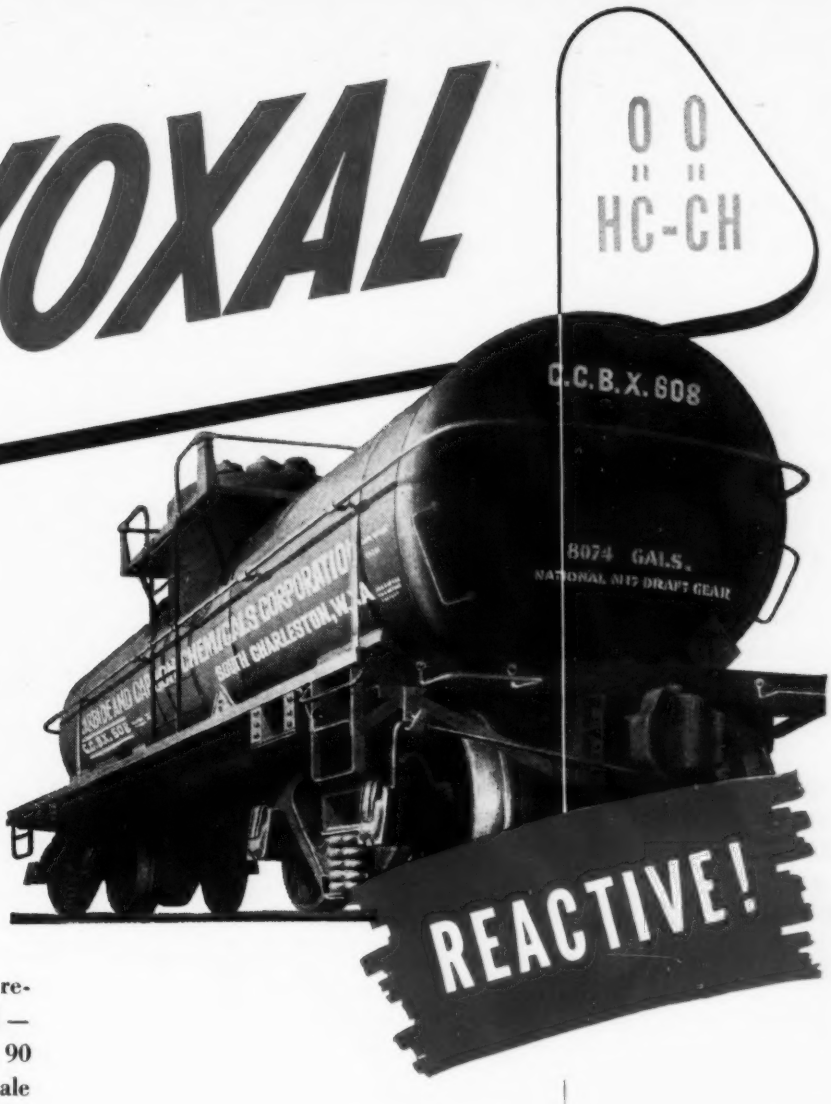

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κατά (Down) +
λύ-ειν (To Loosen)

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J. J. Berzelius (1779-1848)

Davison Gel Type Catalysts are important contributions to catalytic chemistry. The chemical composition of Davison Gel Type Catalysts, unlike that of natural catalysts, can be carefully controlled. Davison can cooperate with you in producing a catalyst "custom made" for your process.

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KARBATE
BRAND
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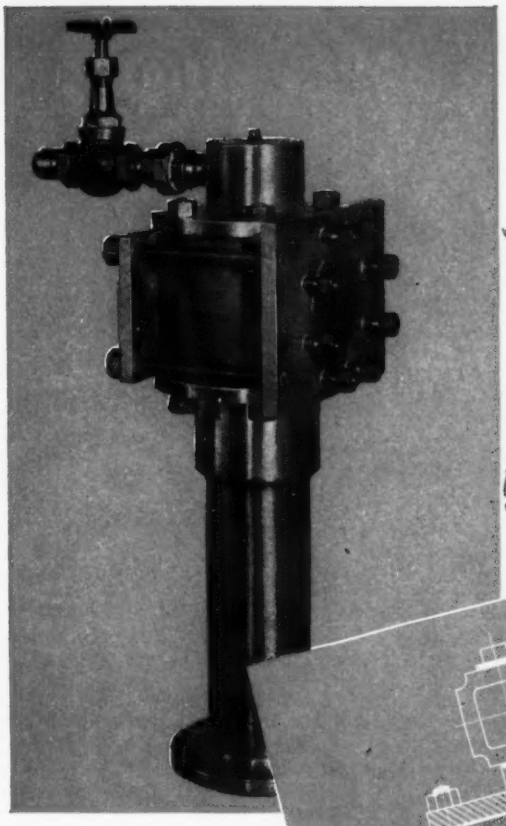

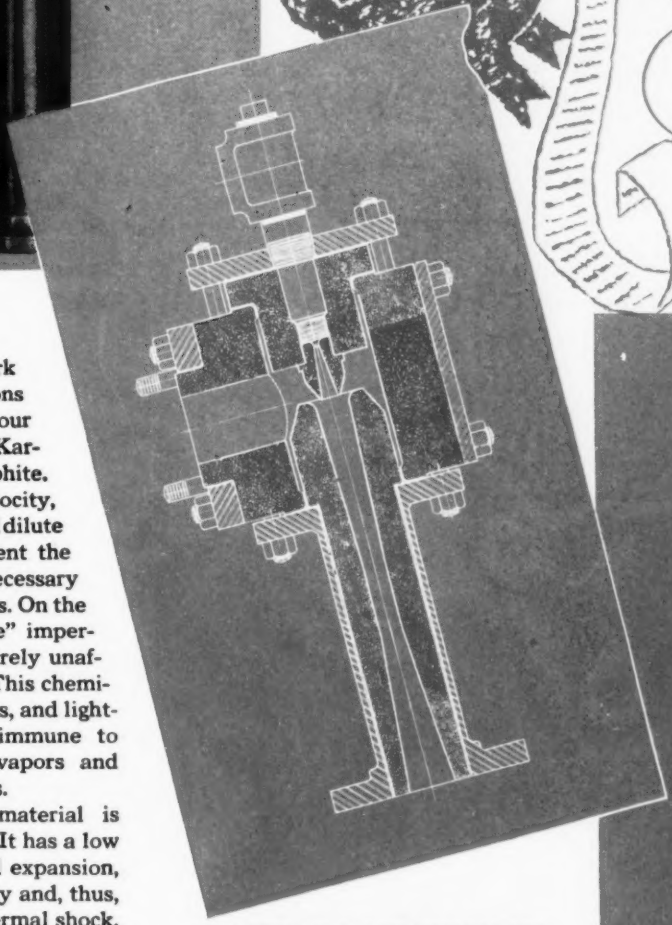

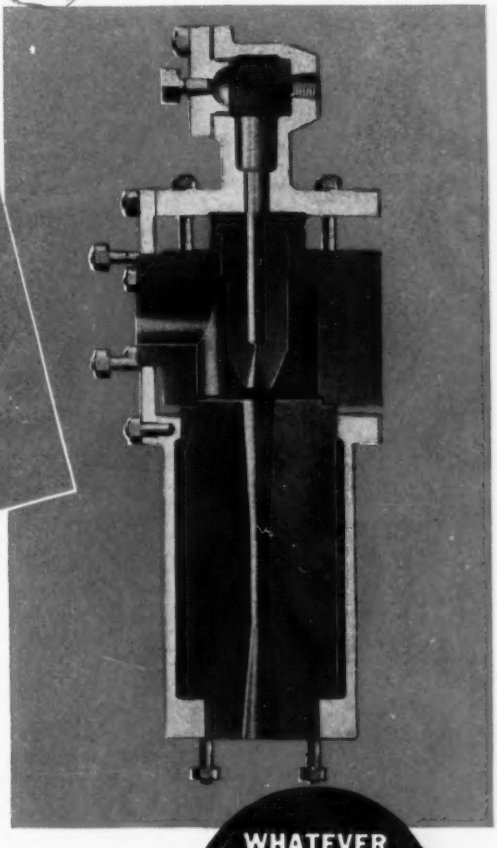

● Wherever you work with corrosive solutions —it pays to have your ejectors lined with "Karbate" impervious graphite. For high steam jet velocity, high temperature, and dilute vapor mixtures prevent the formation of a film necessary to protect most metals. On the other hand, "Karbate" impervious graphite is entirely unaffected by corrosion. This chemically inert, non-porous, and lightweight material is immune to most general acid vapors and special caustic vapors.

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They also withstand extreme heat shock.

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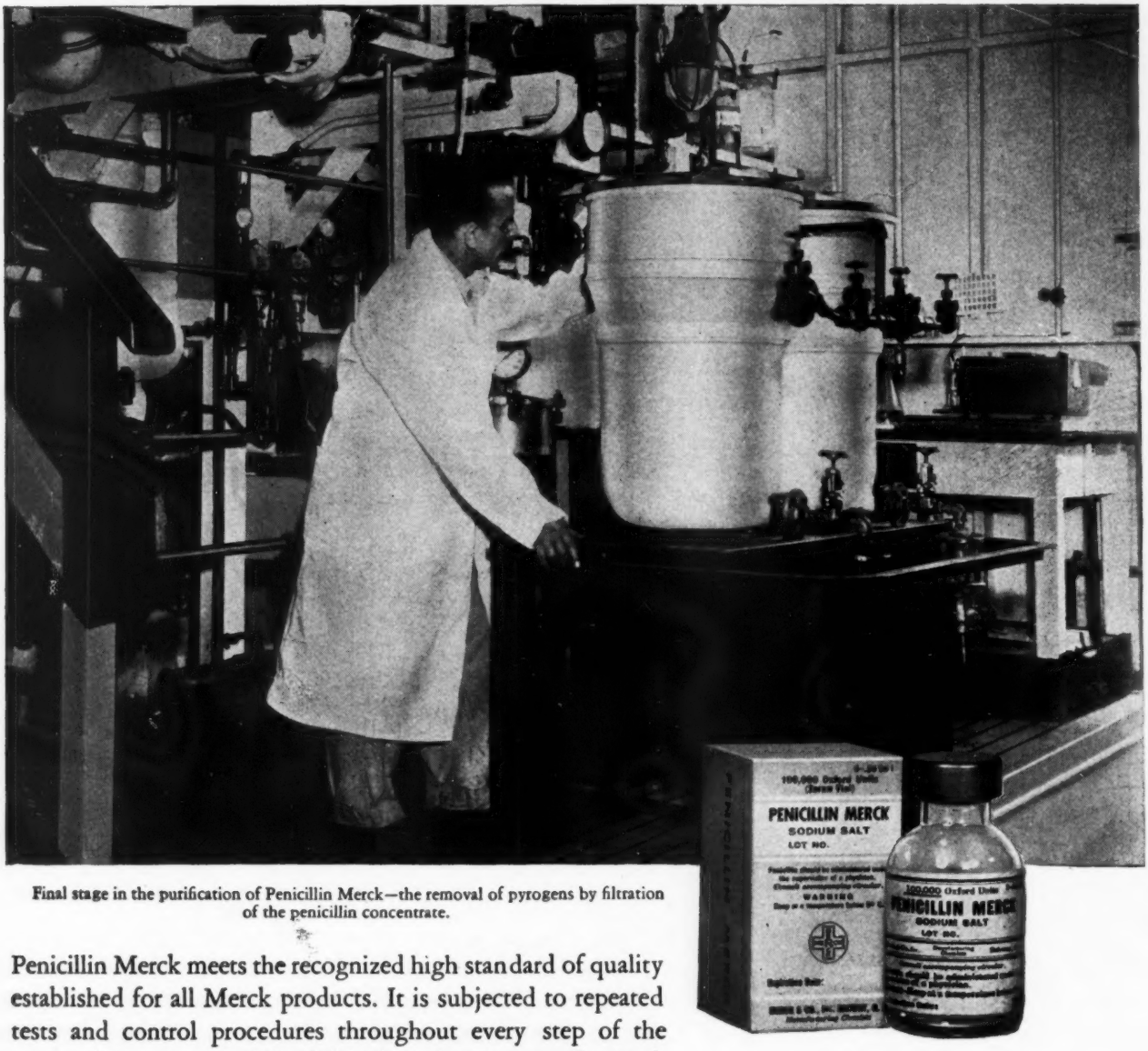

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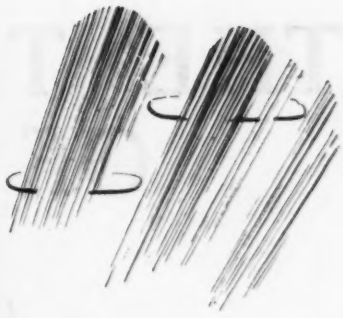
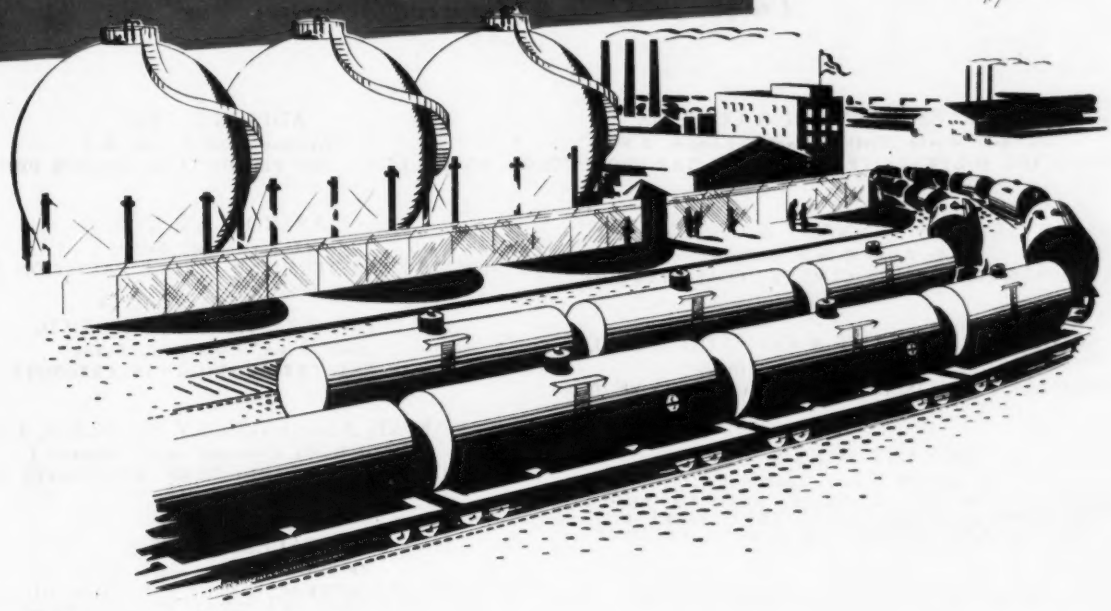
Now Available for Industrial Use





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Fertilizers
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– and in –

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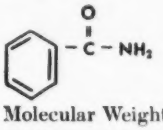
Hooker Research Presents Three New Chemicals with a Useful Future

Among the many new chemicals Hooker Research has developed during the past year, the three listed here have proved of such interest to research chemists and in such different areas that we feel warranted in bringing them to your attention again. Should a scanning of the condensed description cause a desire for more detailed information on any of them, we shall be glad to send you Technical Data Sheets giving more comprehensive physical and chemical characteristics. The coupon below makes it easier for you to request additional information.

BENZAMIDE

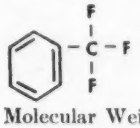


Molecular Weight	121.3
Melting point	125°C
Boiling point	290°C
Flash point	164°C
Fire point	185°C

Benzamide (Amide of Benzoic Acid) is a white, free-flowing monoclinic crystalline material. It is soluble in alcohol, acetone, hot water, and hot benzene; slightly soluble in cold water and other solvents.

Its physical and chemical properties suggest its possible application in the field of organic synthesis, including dyestuffs, pharmaceuticals and plastics. It is compatible with a limited number of resins including cellulose acetate and nitrocellulose with which it forms a firm transparent film.

BENZOTRIFLUORIDE

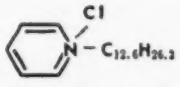


Molecular Weight	146.1
Freezing range	-28.5° to -29.5°C
Boiling range(ASTM,98%)	2.5° including 101°C
Refractive index, n20/D	1.4145±.0005
Specific gravity, 15.5°/15.5°C	1.197±.001
Flash point	12°C

Benzotrifluoride is a water white liquid with an aromatic odor. It is completely miscible with most organic solvents. Thermal stability is excellent and under nitration or chlorination the CF_3 group is strongly meta directing.

A study of possible applications indicates that Benzotrifluoride may be of value in several industrial fields; dyestuffs, dielectrics, medicinals, insecticides, or other organic chemical synthesis.

LIQUID LAURYL PYRIDINIUM CHLORIDE



Molecular Weight (ave. active ingredient)	292.3
Specific Gravity, 15.5°/15.5°C	1.00
Freezing point	-1°C
Boiling point	100°C
pH	7.0

Liquid L. P. C. is a 30% water solution of Lauryl Pyridinium Chloride. It is a purified, non-staining, odorless, practically colorless product. It is miscible in any proportion with water and water miscible solvents as lower alcohols, acetone, and glycols. It is a cationic surface-active quaternary ammonium derivative possessing strong bactericidal and bacteriostatic properties.

Its germicidal, detergent, and penetrating characteristics suggest many possible applications in the field of detergent antiseptics, in the preparation of fungicides and disinfectants, and in textile finishing compounds. It also has possibilities in the preparation of cosmetic cotton, sterile bandages and other bactericidal or germicidal specialties.

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RADIOLOGICAL SAFETY

A New Field for Research

by ROBERT L. TAYLOR, editor

A point glossed over in many of the newspaper accounts of the Bikini atomic bomb tests is that as a weapon and as a hazard to life atomic fission packs not one deadly punch but two. Who escapes the terrific concussion of an atomic explosion may rejoice only to find that he has been marked for a no less terrible death from radioactivity some days or weeks later. That is the grim truth confirmed by the animals on the target ships at Bikini, some ten per cent of which died from delayed radiation effects up to three weeks after the blast.

With the atomic age have arisen entirely new problems of radiological safety. Not only will warfare require protective measures against flying neutrons and gamma radiation, but ways must be worked out to protect persons handling radioactive materials in everyday lines of work.

Previously, radioactive substances were so rare and available in such microscopic quantities that they were handled only by a few highly trained specialists, and then only with elaborate precautions. Today, with radio-active materials being produced in quantity and coming in contact with many unskilled people in their manufacture, packaging, transport, storage and use, the problems of safety are increased many fold.

There is need, for example, for simpler and more foolproof protective devices in the manufacturing operations. Although the safety records at Oak Ridge, Hanford, and the government radiation laboratories have reportedly been good, it has been at the expense of costly barriers and time-consuming, ponderous methods.

Shipping containers for radioactive materials present another problem. A committee of radiological, container and shipping experts has been working for months on the design and construction of siutable containers. As radioactive isotopes become more generally available for clinical and industrial work it will be necessary that they be unmistakably marked, and shielded and sealed in foolproof fashion.

And then there is the whole great field of the medical and physiological aspects of radioactivity on the human body—the exact effect of radiation on the various organs and parts of the body, the symptoms and diagnosis of radiation poisoning, its nature, the mechanism of the delayed reactions, and finally, of course, methods of treatment. All of these constitute a large, virtually unexplored world which must be penetrated by pharmacologists, chemists and other researchers.

More must be known about the capacity of the body for absorbing radiation without ill effects, whether that capacity can be increased, and how. What protective measures in the way of clothing and shields—or perhaps electrical, magnetic, or other "ray" interference—are possible? Because so little was known about these things, maximum allowable tolerance for radioactivity at the Bikini tests was set at 0.1 Roentgen per 24 hours, or about as much as you get when you have your chest X-rayed, to make sure of being on the safe side. In the light of future knowledge, this may prove to be ridiculously low.

Decontamination methods offer another big field for research in radiological safety. Can radioactive materials be made to accelerate their rate of decay? How can radioactive fission products be removed from a surface on which they have been deposited? Is the answer to be found in chemical methods, or can we invent a "degausser" for radioactivity?

These are some of the things that offer a challenge now to physical, chemical and medical research. They are problems which, if not completely solved, we must know much more about than we do today if we are to be prepared to protect ourselves at a non-prohibitive cost from the terrible effects of gamma radiation. One need only see the photographs now being released from Hiroshima and Nagasaki one year after to realize what horrible disfigurement the rays can cause even among the victims who survive.

And radiological safety research now need not be construed as an admission that atomic energy as an instrument of war cannot be controlled. International outlawing of war itself is still the only sure protection against any weapon, for ourselves and for the people of the world, and we must constantly strive toward that end. But this does not alter the immediate need for more knowledge about all phases of radiological safety.

More Theory for Chemical Engineers

HOW MUCH PRACTICAL TRAINING in unit operations and unit processes should be included in the requirements for a chemical engineering degree has long been a subject of earnest discussion among chemical engineering educators. Most curricula as they are set up today are a compromise somewhere between the extremes of the theoretical and the practical lines of reasoning.

One of those who has longest and most consistently advanced the merits of a sound theoretical groundwork is Prof. W. N. Lacey, head of the department of chemical engineering at California Institute of Technology. Accordingly, Professor Lacey has developed a chemical engineering curriculum at Cal Tech that is unique. Offered at graduate level only, its philosophy is well expressed in the Institute's prospectus:

"It is the Institute's conviction that it is to the best interest of its graduate students to avoid devoting time to subject matter which can be covered even approximately as well while working in industry. . . . This covers specialized courses with industrial applications. On the other hand, many of the basic subjects which are essential to constructive engineering thinking are most difficult to master without aid of sympathetic and continuous instruction. For these reasons, graduate work in chemical engineering is concentrated in such subjects as phase behavior, thermodynamics, heat transfer, fluid mechanics, combustion, and diffusional processes."

To some members of industry this may be a new conception of what a chemical engineering education should do. As chemical engineering science advances, however, and fields of specialization emerge, it seems logical that there should be a growing place in industry, especially in research positions, for men with more than the usual amount of theoretical training. Chemical manufacturers may well find that some of its greatest opportunities in the future lie along trails that such men will be able to blaze.—RLT.

Crucial Transportation Conditions

JUST RECEIVING RECOGNITION is the fact that the U. S. is confronted by a really serious shortage of freight cars—a shortage which by next month will become more acute than any which has obtained in the past twenty years. The question of when goods can be shipped will be an all-important one to industry, and may well govern production and profits.

The chemical industry will be affected both directly and indirectly. For, in the first place, chemical shipments alone total 96 million tons annually—a full 82 per cent of which is moved by rail freight. Too, raw material shipments will be hampered, and the backlash of general industrial dislocation will be felt, inevitably, by both chemical producers and distributors. The worst period can be expected in the latter months of this year. Little improvement in the situation can be anticipated until well on in 1947.

Sound statistics from the American Association of Railroads support such views. During the war, all railroads ran their equipment—more than half of which was over 20 years old—until it literally began to fall apart. In the first six months of this year 29,000 cars had to be scrapped, and available replacements totaled only 18,000 units. Net deficit: 11,000 cars. Plainly, new equipment just isn't emerging from car shops in adequate quantity.

But equally significant is the character of peace-time traffic. Cars are loaded lighter than was the case during the war, and even though hauls are shorter, turn-around time—the number of days a car is tied up by a single load—is longer. Yet a half day pared from the present 12.7 day turn-around would be equivalent to adding another 50,000 cars to the nation's rolling stock. And 50,000 freight cars would just about balance the railroads' deficit.

It is of paramount importance, therefore, that every effort be made to speed loading and unloading operations. It may mean putting shippers and receivers, and their crews, on a six day week so that cars won't be held over a weekend. Admittedly, overtime wages will up loading expenses, but in view of the threatening transportation bottleneck, it will be a prudent investment productionwise.—WAJ.

Soda Ash Priorities

A LONG STANDING PRECEDENT was broken this month when the Civilian Production Administration granted a priority under Priorities Regulation 28 for a substantial amount of soda ash to be used by a newcomer in the consumer field, a manufacturer of alumina.

Soda ash has long been in such short supply that established consumers have had to continue into peacetime their voluntary scaling down of demands that was practiced during the war. This system of self-administered allocation has worked equitably and well. Essential needs have been met, and consumers have been reasonably well satisfied that all was being done that could be done.

It is hard to see the justification, therefore, for CPA's action now in granting, counter to the recommendation of the alkali industry committee, a priority which is going to work further hardship on present users of soda ash. These users are already accepting less than enough to meet their requirements, and the priority grant means cutting down further in order to supply a new consumer whose prior essentiality in the civilian production picture is at best open to question.

CPA has now opened the door to similar requests from the many other soda ash users who could claim eligibility under PR 28. If all choose to exercise their prerogative, soda ash distribution could easily become a mad scramble for priorities that would result in far less equity and justice than under the voluntary system. Latest reports are that additional priority applications are already being filled.—RLT.

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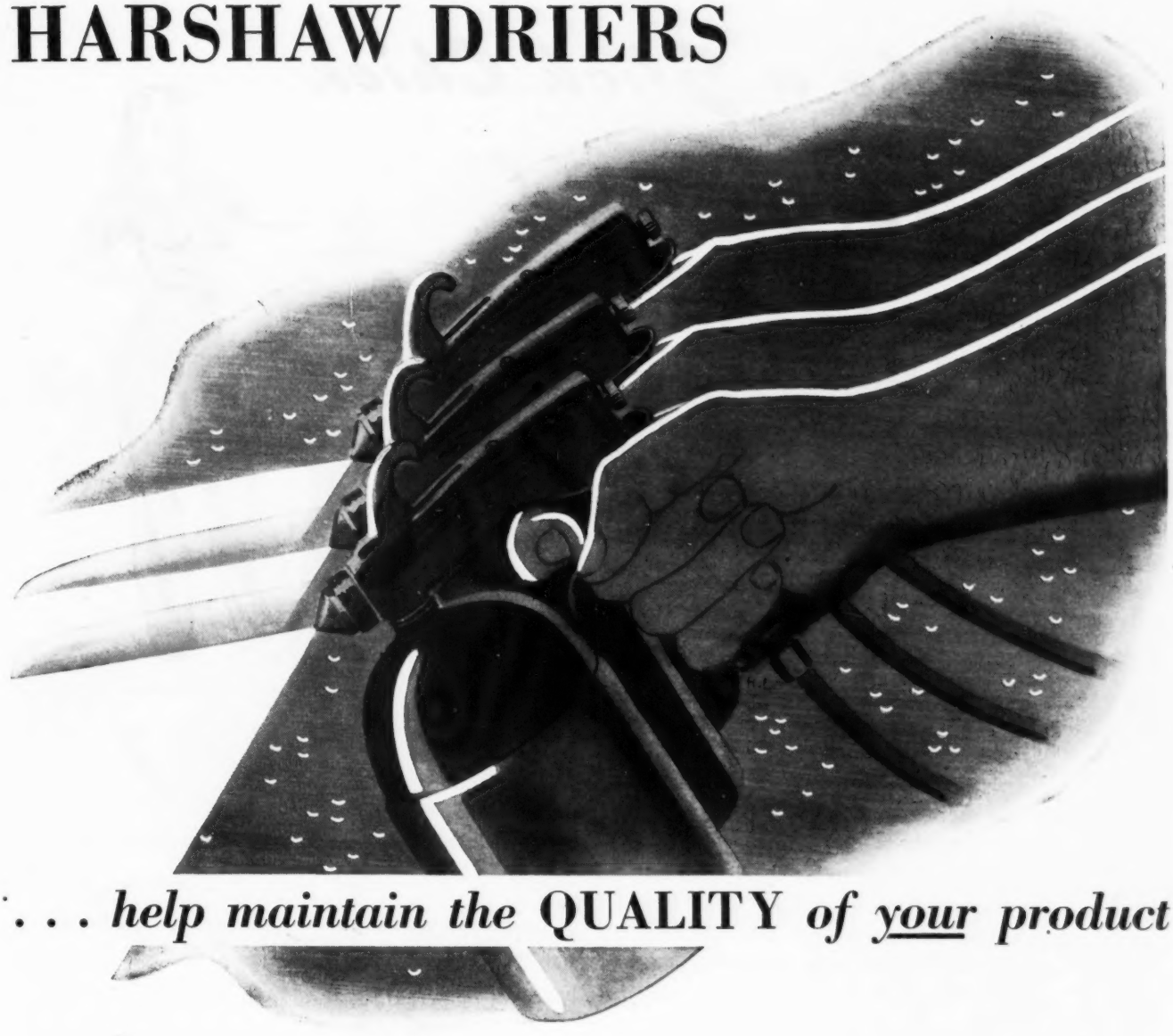

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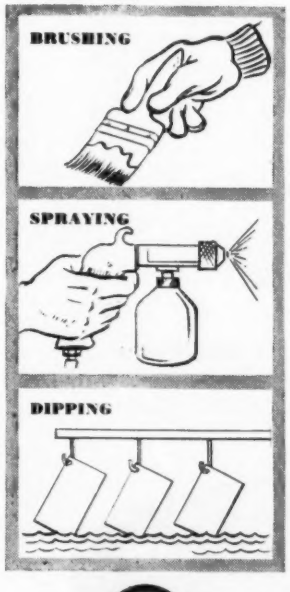

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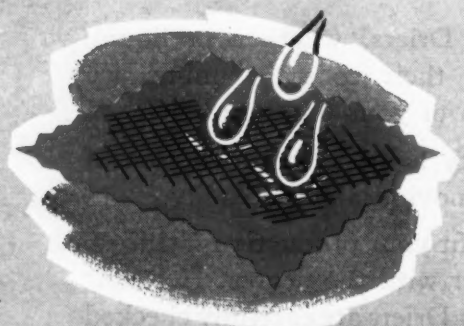

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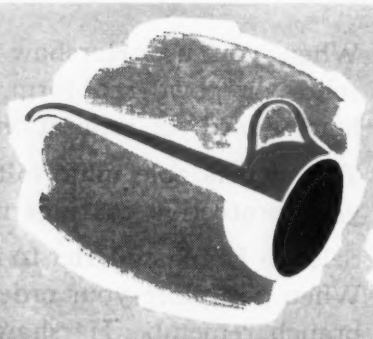

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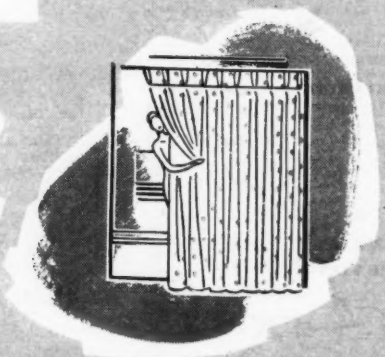

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Chemical Industries
SEPTEMBER, 1946

Petroleum Provides New HYDROCARBONS for the Chemical Industry

by C. C. CRAWFORD, Chemical Products Department,
Phillips Petroleum Co., Bartlesville, Oklahoma

HYDROCARBONS ARE BECOMING INCREASINGLY IMPORTANT as chemical intermediates, accounting for more than 20 per cent of all the raw materials utilized by the chemical industry in 1944. The bulk of this large poundage was made up of compounds containing one to four carbon atoms, however, new products with higher molecular weights such as cyclohexane, n-heptane, diisopropyl, o-xylene, toluene, etc., give promise of greatly expanding markets for petroleum hydrocarbons in the chemical industry. In spite of their low cost, there are many economic problems attendant on their use in chemical synthesis. These include impermanent supply because of changing processes employed in petroleum refinery operations, problems of the location of the supply and of the purity of the final product.

THE further refinement of separation techniques, that has taken place in the past few years, has permitted the commercial production of many new hydrocarbons from petroleum. Such compounds fall into two classifications, those which heretofore did not enjoy a large volume usage because of high price and short supply as in the case of n-heptane, and those commercially available materials which are now being produced from petroleum for the first time. Cyclohexane is an example of this latter classification.

Recent releases by the U. S. Tariff Commission of synthetic organic chemical production in the United States emphasizes the growing dominance of petroleum as a raw material for chemical industry. The Commission's preliminary 1944 report indicated that about fifteen and one-half billion pounds of synthetic organic chemicals were manufactured in this country in that year. Of this total, about three billion pounds stemmed from petroleum raw materials. This is an impressive output. No longer can it be said that chemistry depends entirely upon coal-tar and the naturally occurring raw materials for its building blocks.

The growth of petroleum-derived chemicals has been very marked in recent years as illustrated by the following tabulation:

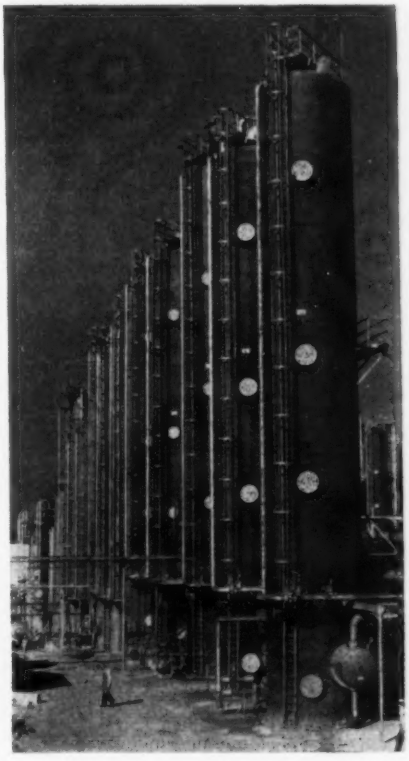
Table I. United States Production of Chemical Raw Materials Derived from Petroleum*

Year	*Total Synthetic Organic Chemical Production*** *(Thousands of Pounds)*	*Raw Materials Derived from Petroleum (Thousands of Pounds)*
1944	15,540	3,001
1943	12,238	1,565
1942	9,314	194
1941	6,790	.....
1940	5,262	.....
1939	4,080	.....
Avg. 1934-1938	2,697	.....

*Source: Yearly releases of U. S. Tariff Commission—preliminary reports.

** Includes intermediates and finihsed products.

The development of hydrocarbons for chemical usage has only begun, however, and future years are certain to witness a further expansion of the present trend. Most of the hydrocarbons consumed to date in chemical synthesis have contained four or fewer carbon atoms—butadiene, the butylenes and butanes, propane, propylene and ethylene. Sizable quantities of toluene, xylene, cresylic and naphthenic acids have also been used. A number of other hydrocarbon compounds of higher molecular weight are currently being sup-



"It has recently been found possible to recover a cyclohexane concentrate from natural gasoline by fractionation methods. Products with purities in excess of 85% are possible."

plied for chemical conversion, however.

CYCLOHEXANE

One of the most interesting of the newer compounds now being prepared from petroleum is cyclohexane. This material has long been prepared through the hydrogenation of benzene derived from coal-tar: hydrogenation costs have usually been high, however, which in part accounts for the presently posted price of $0.095 per pound in tank car quantities. The development of cyclohexane from petroleum will do much to relieve an anticipated benzene shortage, occasioned by increased demands of phenol, nylon and styrene, and will permit the diversion of benzene to products long ago cut off from a supply.

Practically speaking, cyclohexane can be recovered from petroleum by either of two routes. If fractionation by the usual methods be employed for the recovery, the problem is especially knotty. In both natural and straight run gasolines, there are a number of other compounds with boiling points very close to that of cyclohexane (80.4°C), and some of these interfere in the separation. One of the most troublesome compounds to remove is 2,4-dimethylpentane, whose boiling point is almost identical with that of cyclohexane. 2,2 dimethylpentane and benzene are likewise contaminants. The problem is further complicated if cracked stocks, with resulting olefins and other aromatic compounds are employed as feed stocks for cyclohexane preparations.

It has recently been found possible, however, to recover a cyclohexane concentrate from natural gasoline by fractionation methods. Products with purities in excess of 85% are possible (Table II).

Table II. Typical Properties and Composition of a Petroleum-Derived Cyclohexane

Component	*Liquid Volume Per Cent*
Cyclohexane	86.6
n-hexane	0.3
Methyl-cyclopentane	0.1
2,2 di-me-pentane	4.7
Benzene	0.0
2,4 di-me-pentane	7.8
3-me-hexane	0.5
Total	100.0
Refractive Index	1.4224
Kauri Butanol Number	48.0
Aniline Number	92.5 F
Specific Gravity 60/60	0.7732
A.S.T.M. Distillation	
IBP, F	172
10%	174
50%	175
90%	175
Dry Point	176
Recovery	99.4%
Loss	0.6%

Still higher purities are possible, although manufacturing difficulties increase as the demand for purity increases. Benzene can be substantially removed. To achieve such a product, an enormous refinement in conventional distillation practices was necessary. Operation of distilling equipment of very high efficiency possessing at least one-hundred actual plates or more is involved, as is the employment of very high reflux ratios. Because of the inherent difficulty of this separation, recovery of cyclohexane from petroleum represents a milestone of progress in fractionation techniques.

Another process route which avoids some of the above-mentioned separation difficulties, but introduces a problem of conversion, consists in the isomerization of methylcyclopentane to cyclohexane. Thus it is possible to prepare a normal hexane - methylcyclopentane concentrate containing appreciable quantities of the latter and substantially free of any other hydrocarbon compounds. Subjection of this mixture to mild isomerization conditions with Friedel-Crafts type catalysts, or others, will result in the selective isomerization of the methylcyclopentane to cyclohexane, with very little of the normal hexane content being affected. If the original feed stock was sufficiently well segregated, it would have contained very little material boiling above 74°C. After isomerization, the product would contain cyclohexane boiling at 80.4°C. Separation of the latter is thus made simpler, and a product of fairly high purity can be prepared. The presence of benzene in the original normal hexane-methylcyclopentane feed stock usually has a deleterious effect upon isomerization.

It is obvious that the potential production of cyclohexane from petroleum in this country is enormous, although it is doubtful if more than a mere fraction of the total will ever be recovered. West Coast stocks are particularly high in cyclohexane content. Selected stocks in the Gulf Coast and Mid-Continent are likewise relatively good sources of cyclohexane.

One of the most interesting uses of cyclohexane is in the manufacture of nylon, the synthetic resinous material which is produced by the oxidation and further treatment of cyclohexane. Another important use of cyclohexane is as a solvent, particularly in the manufacture of shoe cements. Its comparative nontoxicity and good solvent power make it particularly attractive for this use. It is also used in the manufacture of photographic film.

ORTHO-XYLENE

A recent newcomer in the ranks of aromatic hydrocarbons is orthoxylene, currently being employed in a new oxidation process for phthalic anhydride production on the West Coast.[3] Separation of this product by distillation or precipitation techniques from its meta- and para-isomers, with which it occurs in cracked petroleum fractions, is especially difficult owing to the proximity of freezing and boiling points of these and related compounds. The tabulation in Table III is illustrative.

The problem of purification is further complicated by the presence of small amounts of paraffinic hydrocarbons, notably some of the iso-nonanes and tri-methyl

Table III. Boiling and Freezing Points of Some Aromatic Hydrocarbons in the Ortho-Xylene Range*

Compound	*B.P.°C.*	*M.P.°C.*
Ethyl benzene	136.15°C.	−94.96°C.
Para-xylene	138.4	+13.21
Meta-xylene	139.2	−47.8
Ortho-xylene	144.5	−25.0
Styrene	145.2°C.	−30.6°C.

* All values taken from Doss, "Physical Properties of the Principal Hydrocarbons," 4th Edition, 1943.

cyclohexanes, which boil in the same range as ortho-xylene.

Recovery of high purity ortho-xylene from petroleum has been made possible by two separate developments:

1) The perfection of petroleum conversion techniques (e.g., the Hydroforming Process) which give high yields of aromatic compounds, and

2) A refinement in conventional distillation practices.

Details of Hydroforming[4] and related processes have appeared elsewhere; these processes are unique in that they produce very high yields of aromatic compounds. From such stocks suitable concentrates can be prepared which serve as the feed material for the final purification step wherein advantage is taken of the fact that ortho-xylene is the highest boiling of the three isomers. As with cyclohexane and n-heptane production, distilling columns operating under very high reflux ratios are necessary. By suitable process control, a product with purity in excess of 90% is possible.

Mixed xylenes from coal-tar sources have been available to chemical industry for many years. This same product has also been prepared from petroleum within the past decade. Ortho-xylene, however, is of very recent origin. To date, its only significant usage as been in phthalic anhydride manufacture, but in time it should find still other outlets as a chemical intermediate.

NORMAL HEPTANE

Still another new hydrocarbon development of interest to chemical industry is normal heptane with a purity of 99%. This product has only been announced recently and it is expected to find many new uses.

Perhaps the oldest commercial method of manufacture of normal heptane is by distillation of Jeffery Pine, which grows extensively on the West Coast. This method was the sole source of normal heptane for many years, although the total production was relatively minor.

A later method involved the cracking of castor oil in the presence of metallic sodium. This method is understood to have been used lately as a source of normal heptane. Production costs, as with the distillation of Jeffery Pine, are high, and considerable care in operation is required.

The recovery of normal heptane in high

purity from petroleum by fractionation is as great a feat as the production of cyclohexane, inasmuch as the separational problems are every bit as difficult. The dimethylcyclopentanes, methylcyclohexane, toluene, and some of the isoheptanes are especially difficult to remove. As with cyclohexane, fractionating equipment of very high efficiency is required. Contrary to cyclohexane, it is not possible to prepare normal heptane economically by isomerization techniques, (Table IV).

Table IV. Typical Properties of Petroleum-Derived N-Heptane

Purity, mol per cent	99+
Freezing point	−131.36 F
Distillation Temperature	209 F
Density of liquid at 20 C	0.6839 g. per ml.
Refractive Index at 20 C	1.3877
A.S.T.M. Motor Octane Number	0.5 Max.

One of the chief uses at present for normal heptane is as a reference standard in octane number evaluation of motor fuels. Because of its extreme tendency to produce knock in an internal combustion engine, normal heptane was long ago given the arbitrary value of zero, and 2,2,4-trimethylpentane the value of 100, on a knock testing scale. Because of the difficulty and expense of obtaining high grade normal heptane, it has been common practice in the motor fuel industry to establish what is known as "secondary" reference fuel normal heptane. This product, usually of low octane number and moderate cost, is calibrated against pure normal heptane and is used in most octane number determinations in place of the more high-priced product. The introduction of 99 minimum per cent purity normal heptane at moderate cost from petroleum should eliminate the need for most of the "secondary" reference fuels and the attendant difficulties of correlation and interpretation.

TOLUENE

Like cumene, petroleum-derived toluene was born during wartime. Unlike cumene, it is expected to partially survive into the peacetime era. A major portion of the war-time producing capacity of petroleum toluene is presently inoperative, but at least one producer is still active. For the immediate future, no shortage of toluene in the United States is anticipated, inasmuch as the War Assets Corporation has been dumping relatively large amounts of war-produced surpluses onto the civilian market. This fact, together with the greater-than-prewar capacity of the United States coke-oven toluene production points unmistakably to adequate supplies of this product for some time to come.

Toluene from petroleum, like nearly all the other hydrocarbons mentioned above, has been made possible by new distillation methods. Details of manufacture have already appeared in the literature. In brief, the process consists in preparation of a toluene-rich feed of narrow boiling range by straight-forward, efficient fractionation of specially-prepared stocks followed by either extractive distillation employing phenol, cresol, etc., as an entraining agent or by a liquid-liquid, countercurrent extraction with sulfur dioxide or other extractive agents. Under favorable operating conditions, it is believed that petroleum-produced toluene will be able to hold its own in the peace-time markets with toluene obtained from coal-tar.

It is well-known that a major usage of toluene to date has been in explosives. In assessing the future utilization of this product, the effect the atom bomb development will have should not be overlooked. Unless new usages appear it is entirely possible that toluene may decline in importance to chemical industry.

DIISOPROPYL

Diisopropyl (2,3 dimethyl butane) is a new member of the hydrocarbon family born during wartime. Produced through the alkylation of ethylene with isobutane under carefully controlled conditions (2), this product has been prepared in a purity exceeding 99%, (Table V). It is an unusual hydrocarbon in that it possesses two tertiary carbon atoms. As a premium aviation fuel component it has few peers.

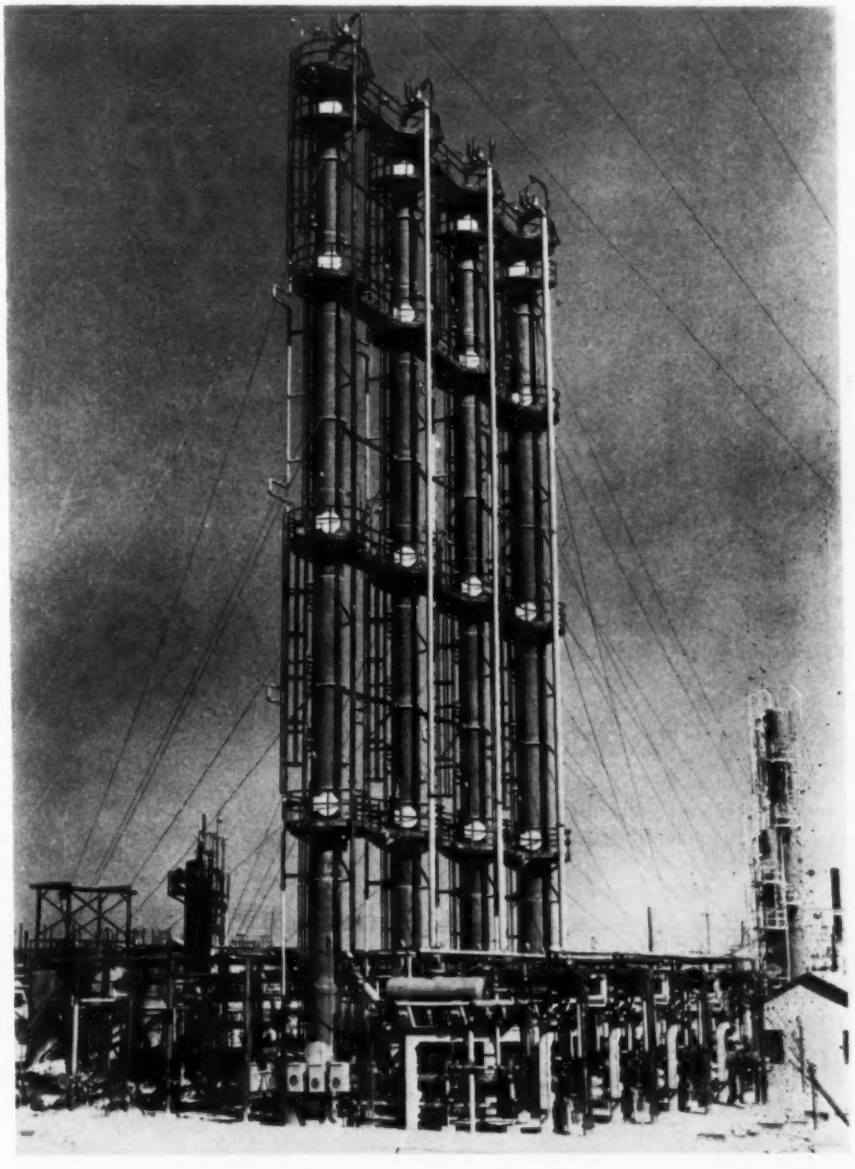
Table V. Typical Properties of 2, 3, Di-Me-Butane

Purity	99+%
Freezing point	−201.0 F
Boiling point	136.4 F
Specific Gravity 60/60 F	0.666
Refractive Index	1.375

Because of its newness, no substantial chemical uses for diisopropyl have yet been found. It is expected to find application, however, as a selective solvent, a precipitant and chemical intermediate.

CUMENE

Production of cumene (isopropyl benzene) during wartime through the alky-



High efficiency experimental fractionating columns such as the above were utilized in the development of processes for production of such hydrocarbons as n-heptane, cyclohexane and many other chemical building blocks from petroleum.

lation of benzene with petroleum-derived propylene reached impressive levels for use as an aviation fuel component, but manufacture of this product since V-J day has practically ceased. Known chemical usages for cumene are small. It is doubtful if its production will be revived unless the aviation gasoline market demands it, which is not now considered very likely. Present indications are that cumene was strictly a "war-baby" that did not survive the advent of peace.

ODORLESS NAPHTHAS

Some interesting new developments have lately materialized in the naphtha field as well as in the high-purity hydrocarbon field. One of them is the successful production of a series of odorless naphthas that should be of great interest in the paint and varnish, dry cleaning, insecticide, ink, oil and related fields. The objectionable odor associated with paint has for the most part originated with the thinner. The unpleasant smell frequently associated with clothes immediately after dry cleaning is likewise attributable to the solvent employed in the process. It is for these reasons that the perfuming, or "deodorization", of naphthas has come into vogue, however, such methods are only partially successful.

Fairly successful attempts have been made to prepare odorless naphthas through treatment of selected straight run fractions with strong sulfuric acid followed by caustic soda treatment and in some cases percolation over clay or other adsorptive materials. Such methods are only partially successful inasmuch as removal of odor-producing components is not complete.

By a recently perfected process, it has been possible to prepare naphthas of extremely low odor qualities. No sulfuric acid is required for the process. It was necessary to sacrifice solvent power in order to gain the desired odor characteristics. This means a change in formulation for the paint and varnish manufacturer. Many varnish resins have only a limited solubility in these new naphthas, but this shortcoming is not insurmountable.

For the dry-cleaner, employment of odorless naphthas results in a considerable saving in "tumbling" time necessary for odor removal. It has been found possible to deodorize garments cleaned in these new solvents in half the time normally required with ordinary dry-cleaning solvent. The resulting increase in plant output means a considerable money saving to the dry-cleaner.

PRECIPITATION NAPHTHAS

The demand for petroleum naphthas of high solvent power is well known and long established. This accounts for the wide usage of toluene and higher aromatic compounds in chemical industry. Not so well known is the fact that there is an increasing demand for petroleum naphthas having the lowest possible solvent power. Such products have application in effecting separations which depend upon solubility differences. The well-known process for the dewaxing of lube oil with propane is built upon this principle. Other separations employing precipitation naphthas of considerably higher boiling point than propane are coming into existence.

There are factors which are at once favorable and unfavorable in the utilization of hydrocarbons by chemical industry. One of the most attractive aspects of their use, in many cases, is the low price at which they are supplied. An inpermanent availability at locations considerably removed from the chemical markets, and often in lower-than-desired purities, is among the less favorable aspects.

CHEAPNESS OF HYDROCARBONS

Undoubtedly one of the major reasons why the chemical industry is turning to petroleum for raw materials is the cheapness of certain petroleum products. While there are a number of exceptions, the reasons for which are discussed below, it is nevertheless true that specific hydrocarbons of purity in excess of 95% are available in commercial quantities in the Southwest for as little as 7/10c per pound. Few raw materials from other sources can match such a figure. Table VI presents a list of some hydrocarbons available to the chemical purchaser today, together with approximate prices and purities. Also listed for comparative purposes are the prices of some well established raw materials from other sources. All the paraffins from propane through normal heptane, including the iso-fractions, can be had f.o.b. refinery for less than 2c per pound. Toluene and xylene run somewhat higher, while butadiene commands a higher price than perhaps any of the larger-volume petroleum hydrocarbons.

Table VI. Comparison of Prices of Some Chemical Raw Materials, Obtainable from Petroleum and Other Sources*

Product	*Purity or Grade*	*Cost in Cents per Pound*
PETROLEUM PRODUCTS:		
Propane	95%	0.6
Isobutane	95%	0.9
Normal Butane	95%	0.6
Isopentane	95%	1.5
Normal Pentane	95%	1.3
Isohexanes	90%	2.0
Normal Hexane	70-75%	1.8
Isoheptanes	60-70%	1.9
Normal Heptane	60-70%	1.8
Butadiene	99%	13.0
Toluene	Nitration	3.7**
Xylene	Industrial	3.6**
NON-PEROLEUM PRODUCTS:		
Stearic Acid	Single Pressed	15.4***
Soybean Oil	Crude	11.8
Rosin, Wood	WW	5.4
Sulfuric Acid	66° (93%)	0.9
Ammonia	Fertilizer	3.0**
Caustic Soda	76%, Solid	2.3
Sulfur	Crude	0.8
Chlorine		1.8

* Most of the prices here quoted were taken from the April 8, 1946, issue of Oil, Paint and Drug Reporter, and are f. o. b. production point unless otherwise indicated.
** Freight allowed or equalized.
*** Delivered basis.

In comparison with these figures, such commonly-used chemicals derived from other sources, as ammonia, sulfuric acid, rosin, etc.,—which commodities are commonly thought of as being "cheap"—appear rather high-priced. There are today at least two dozen of these purified hydrocarbons available to chemical industry; more compounds are appearing constantly. In addition to the above mentioned two dozen, there are approximately 50 other petroleum hydrocarbons available in research or semi-commercial quantities, with more being scheduled for production.

It must not be assumed from the foregoing, however, that *all* hydrocarbons can be produced commercially at the price levels indicated above; such is certainly not the case! Only in specific cases are low prices possible. When production is in limited quantities for research or pilot plant purposes prices will invariably be at a relatively high level.

THE BY-PRODUCT PROBLEM

To achieve the low hydrocarbon prices mentioned above, production of enormous quantities is necessary. The bulk of such large production is generally consumed by the gasoline market and the chemical consumer of hydrocarbons thus gets a "free ride", thanks to the gasoline market, and does not have to carry all operational charges. If such were not the case, costs to the chemicals manufacturer would be exorbitant.

These simple and unalterable facts often constitute a considerable headache to the manufacturer of chemicals, inasmuch as he has no control over the hydrocarbon raw material required for his process. In many cases the chemicals manufacturer is using what amounts to a by-product of the petroleum industry. Being a by-product, its permanence is questionable. Changes in the petroleum industry are often sudden, and the advent of a new operation such as catalytic cracking, dehydrogenation, etc., can render established processes obsolete overnight. When such happens, it is not uncommon for the chemicals manufacturer to find his source of hydrocarbons eliminated entirely or available only at many times their former prices.

The end of the war produced many a dislocation in hydrocarbon supply. Microcrystalline waxes, paraffin waxes, certain of the olefins, dicyclopentadiene, cumene,—all petroleum-derived raw materials having application in the chemical industry—have been considerably shaken by changes in the economics of the petroleum industry.

These generalizations obviously do not apply in those cases where chemical utilization of a hydrocarbon raw material is sufficiently large to merit its production for the chemical market alone, but such cases are rather limited. With very few

exceptions, every hydrocarbon consumed by chemical industry is also used as a fuel. Costs will always be higher than those listed in Table VI if production is for chemical industry only, and is measured in pounds instead of gallons.

THE QUESTION OF PURITY

Still another difficulty frequently encountered in the utilization of hydrocarbons by chemical industry is the matter of purity. As the carbon content of a hydrocarbon increases, the number of possible isomers increases astonishingly. Except in special isolated cases, some of which were discussed above, simple fractionation of petroleum cannot be expected to produce very pure products with compounds containing more than five carbon atoms. This accounts for the fact that purity decreases as carbon content increases in the paraffinic series listed in Table VI. Unless the chemicals manufacturer is able to adapt his process to the use of mixtures, a hydrocarbon often cannot be employed as a raw material. Kerosene, paraffin wax, gas-oils, etc., are examples of mixtures that have been successfully employed by the chemical industry. With a few possible exceptions here and there, it is doubtful if there is any hydrocarbon from petroleum of more than 8 carbon atoms available to chemical industry today in a purity exceeding 90 per cent.

In the majority of cases, chemical industry prefers pure raw materials and the above-described situation imposes a limitation upon the number of high boiling hydrocarbons that will find chemical application.

GEOGRAPHIC PROBLEMS

Another problem that must be taken into consideration when considering the adaptation of petroleum to chemical industry is transportation costs. Much of the natural gas and crude oil reserves of the United States are located in the Southwest or the Far West. The chemical market lies heavily to the East, particularly along the Eastern Seaboard. Getting the two together is often surprisingly difficult.

On the average, it costs about 5¢ to transport a gallon of gasoline in tank cars by rail from Texas to Pennsylvania or New York. If shipment is made by drums, the prices are higher. In the most favorable case, the eastern chemicals manufacturer should count upon spending a minimum of 1¢ per pound in transporting southwestern-produced hydrocarbons to his own plant. In some cases, and for less than tank car quantities, transportation costs can easily run 2¢ or more per pound.

Water transport from the Texas Gulf Coast is a partial answer to these problems, but by no means a complete one. Currently posted tanker rates from the Gulf Coast to the North Atlantic Coast run between 33¢ and 44¢ per barrel for gasoline, kerosene, fuel oil, etc. These rates are enticingly low, but to obtain them a single shipment of 20,000 barrels or more must be made. Such quantities are almost unheard of in the chemical industry. If the quantities to be transported are reduced, the prices rise proportionately.

Many chemical concerns in the United States have sought to avoid the transportation problem by locating plants along the Gulf Coast, intending to ship the finished product, rather than the petroleum raw material, to the eastern chemical markets. This scheme works best for large-volume items such as ethyl alcohol, and styrene.

FUTURE TRENDS

Development of hydrocarbons for chemicals has been made possible in large measure by a refinement in the techniques of separation. It is anticipated that these trends will continue. Multi-plate distillations, including azeotropic and extractive separations, solvent extractions, precipitation techniques and perhaps diffusional methods will all be employed in the difficult task of isolating single isomers from petroleum.

It is expected that paraffins will predominate among the new hydrocarbons offered chemical industry. 2,2,5-trimethylhexane has recently been isolated from the products of butane-butylene alkylation, and is currently offered in limited quantities. Normal octane, isooctanes, normal nonane, etc., can all be made now in the form of concentrates of fairly high purity. Michigan crudes have been split up by one refiner into close boiling normal paraffin concentrates, up to and including the pentadecane region.

Olefins will continue to be of great interest to chemical industry. The importance of ethylene to chemicals is too well known to receive further comment, but it might be said that continued expansion in use of this product will almost certainly come. Because of the high vapor pressure of this product, it cannot be readily transported; hence, its utilization will for the most part be an "over-the-fence" proposition. In other words, the chemicals consumer will have to locate his plant adjacent to a refiner in order to utilize ethylene. Propylene and the butylenes are likewise in demand at present, and will continue to be. There is presently a strong demand for higher olefins, particularly those having a terminal double bond. As yet, however, no satisfactory and economical technique for the manufacture of such olefins has been devised. Olefin concentrates of 90 per cent or higher purity in the C_{10} and higher ranges are expected in the near future.

A similar growth is expected with aromatic compounds. It is doubtful if the petroleum industry, at least for the foreseeable future, will supply benzene; xylene isomers, mesitylene, durene, and other homologs are all future possibilities, however. Still higher homologs, with side chains of 10 or more carbon atom content, are likewise slated for future industrial production.

Among the dienes, 1,2-butadiene is already available in limited experimental quantities. Isoprene has already been supplied by the petroleum industry. Piperylene (1,3-pentadiene) and certain of the hexadienes are likewise slated for industrial production.

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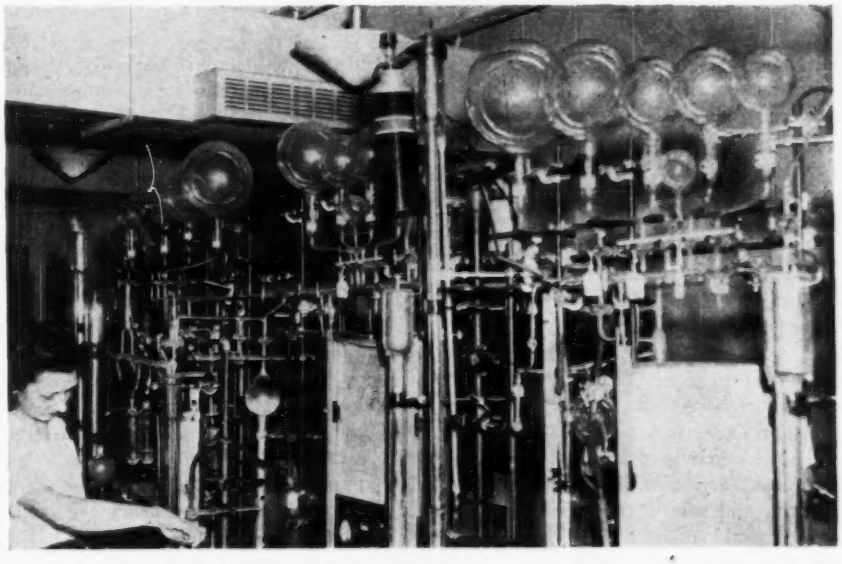

In many cases the analyses of hydrocarbon gases requires use of such complex glass apparatus as that pictured above

INSECT REPELLENTS

Intensive Research Broadens Market

by C. A. SETTERSTROM
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A FEW YEARS AGO insect repellent sales were sundry, mainly due to the limited efficacy of the products then offered. But as an outgrowth of war-stimulated research many new and vastly superior formulations have been developed to create wide domestic and export markets.

CIVILIAN sales of insect repellent have reached an all time high this season because the insect-conscious public likes the new, highly effective, colorless, and almost odorless, liquids which are rubbed on the skin to keep away mosquitoes, flies, gnats, chiggers and other biting pests.

Before the war, insect repellents constituted a steadily growing but modest business. New specially designed chemicals were just beginning to replace the relatively ineffective citronella compositions. During the war, the chemical industry supplied the Army and Navy with over one hundred and fifty million two-ounce bottles of synthetic organic repellents—new military weapons against disease-bearing and annoying pests. The post-war civilian interest in repellents has been stimulated by the homecoming veteran who used repellents in the service; by the DDT publicity which has made the public "insect conscious"; by the publicized research activities of leading State and Federal scientific laboratories, and by increased competitive activities of old and new manufacturers in the field. But the most important reason for continued civilian purchases is consumer satisfaction with the new repellents, one of which will not even attack milady's fingernail lacquer or other common plastics. The modern insect repellent is another triumph of chemical ingenuity.

APPROVED REPELLENTS

The joint Army-Navy specification on insect repellents lists "6-12," "Indalone," dimethyl phthalate and mixtures of the three. The United States Department of Agriculture has just issued a bulletin based on data from their Orlando laboratories which reads in part as follows:

"The following available repellents are effective and safe when used individually or in combination: dimethyl phthlate, dimethyl carbate (cis-bicyclo 2,2,1-5-heptene-2,3-dicarboxylic acid, dimethyl ester), Indalone (*n*-butyl mesityl oxide oxalate), and Rutgers 612 (2-ethyl-1,3-hexanediol).

"These chemicals vary greatly in their effectiveness against different insects and on different individuals. Certain materials which are satisfactory against some species may fail to repel others."

The report then recommends several mixtures of these repellents as being more effective against a wider range of insect species and on more individuals than any one of the chemicals when used alone.

Each of the repellents and each of the mixtures has advantages and disadvantages, so the choice of the best one is a matter of judgment and dependent upon the definition of "best."

"Indalone" is the most effective repellent against biting stable flies but among the least effective against mosquitoes. In the presence of ultra-violet light, it dimerizes to produce an ineffective solid which crystallizes on the skin. "Indalone" is also subject to hydrolysis, is light yellow to reddish brown in color and possesses a characteristic odor unpleasant to many. It is a solvent for nitrocellulose and other resins.

Dimethyl phthalate is markedly inferior to "6-12" against nuisance mosquitoes and many anopheline species, although it is the most effective against the *Anopheles quadrimaculatus* mosquito (this malaria carrier constitutes only about 5% of the total mosquito population of the U. S.). All the approved repellents are about equally effective against chiggers but dimethyl phthalate is a preferred clothing impregnant because it is less soluble in water. Dimethyl phthalate, unfortunately, is an excellent solvent for nitrocellulose and many other resins.

Dimethyl "carbate" (the dimethyl ester of "carbic" anhydride) ("Dimelone") is the newcomer to the Orlando list, and no detailed field data on repellency are available. It is a nitrocellulose solvent, has a characteristic musty odor, and is a colorless crystalline solid in purified form. Limited laboratory tests indicate that it is about 80 per cent as long-lasting as "6-12" against nuisance mosquitoes. At least one producer has had difficulty in producing a toxicologically acceptable commercial product.

"6-12" is the longest lasting repellent against nuisance mosquitoes in this country and against malaria carriers present in the South Pacific. It is as effective against chiggers and black flies as any of the single repellents or mixtures, but it is not the longest lasting repellent against the malaria-carrying *Anopheles quadrimaculatus* mosquito, or against the biting stable fly, *Stomoxys calcitrans* (not a major pest of man but an injurious insect attacking horses and mules). Unlike all of the other compounds listed, "6-12" repellent is not a solvent for nitrocellulose and does not smear, soften or remove most women's nail lacquers. It is not a solvent for nylon, rayon, or "Vinylite" or "Lucite" plastics but it dissolves alcohol-soluble gums such as shellac. It is colorless and practically odorless. Not one single case of skin irritation or dermatitis has been reported despite the use of many millions of bottles of this repellent. When thoroughly applied, and especially when applied to clothes in addition to the skin, "6-12" offers some degree of distance repellency—it keeps the insect pests a few inches away from the body. None of the other repellents or repellent mixtures is as effective in this regard.

The various mixtures suffer from many of the disadvantages and do not retain all the advantages of the single components. None of the mixtures, for example, is as effective against New Jersey nuisance mosquitoes as "6-12." Mosquitoes, of course, are by far the most important and annoying of the insect pests. Many of the mixtures are colored or have an odor and all dissolve nitrocellulose and other resins. No difficulties with "Indalone" instability in the mixtures have been reported, but this may be because the ineffective dimer is soluble in dimethyl phthalate and does not crystallize.

WAR RESEARCH

The first intensive scientific attempt to discover and develop a practical, efficient, and acceptable personal repellent began at New Jersey State Experiment Station,

Rutgers University, about eleven years ago under the immediate direction of Dr. Philip Granett. After careful study, Rutgers selected the yellow fever mosquito, *Aedes agypti,* as their test insect because repellent times correlated well with field studies against New Jersey mosquitoes and because the species gave reproducible results and was easy to rear in the laboratory. When war with Japan became imminent, malaria became a major military problem and on recommendation of the Committee on Medical Research, an O. S. R. D. project was established at the Orlando laboratories of the Bureau of Entomology and Plant Quarantine of the Department of Agriculture. The Orlando group adopted the Rutger's testing techniques, modified them for larger-scale operations, and added the malaria carrier, *Anopheles quadrimaculatus,* as a test species in the hope that it would provide a more accurate measure of repellency against the Pacific malaria carrier. During their research program, they tested over 8,000 compounds and thousands of additional mixtures.

While the phthalates had been known to be a moderately effective repellent against nuisance mosquitoes since 1929, (Basic patents expired this month—ED.) they aroused no great interest until the Orlando Laboratories discovered that dimethyl phthalate was more effective than either "6-12" or "Indalone" against the *Anopheles quadrimaculatus.* This fact, coupled with a claim of evidence of synergism and with the inability of the producers of "6-12" and "Indalone" to supply the huge repellent demands of the Armed Forces led to the adoption of the "6-2-2" mixture containing six parts dimethyl phthalate, two parts of "Indalone" and two parts of ethylhexanediol. Later when the Army and Navy demands slacked off, the approved repellent composition was modified to contain equal parts of the three repellents, a mixture called "1-1-1."

Actually, in the South Pacific, where malaria was of particular importance, it was discovered that "6-12" was superior to dimethyl phthalate and to both of the mixtures in repelling the malaria carrying mosquito.

SURPLUS STOCKS

Over eighty million two-ounce bottles of the Army and Navy repellent mixtures have been declared surplus and are being offered for sale by the War Assets Administration. The surplus stocks consist chiefly of the "6-2-2" mixtures with some "1-1-1" and possibly some very small quantities of straight "6-12," "Indalone" or dimethyl phthalate. Early termination of the Japanese war, and the rapid clean-up with DDT of mosquitoes on malarial islands were major reasons for the large volume of surplus material.

The Army and Navy mixtures were designed for military use and suffer in the domestic market when matched against the tailor-made civilian repellents. Characteristics such as odor, color, solvency for finger nail lacquers, absolute freedom from skin irritation and dermatitis are not as important in a repellent for military purposes as they are in one for civilian applications.

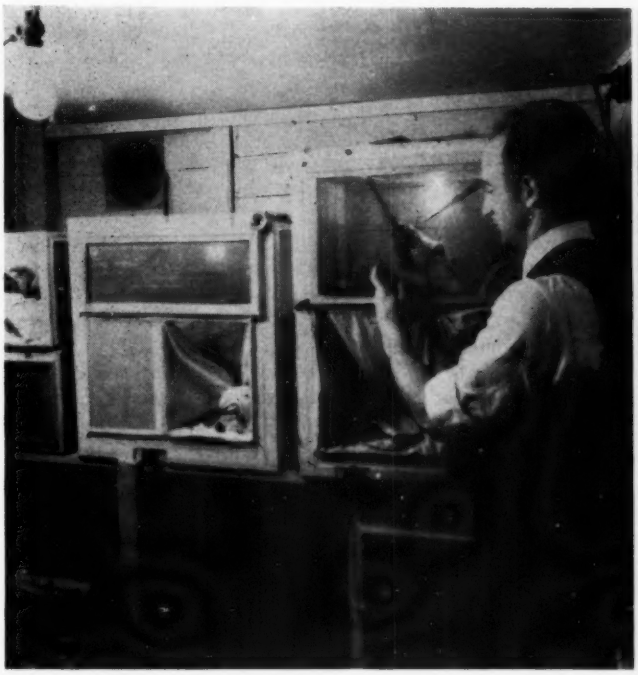
NAVY REPELLENTS

Within the past three years the Naval Medical Research Institute has developed a series of insect repellent chemicals culminating in a mixture of seven parts of 2 phenyl cyclohexanol and three parts of 2 cyclohexyl cyclohexanol which has been designated as NMRI-448. This repellent has been found effective against several species of mosquitoes in tropical areas and is now being further field tested in various Naval units.

NMRL-448 has not, however, been approved by the Navy, purchased by the Navy, or used by the Navy, except in test quantities. Limited field tests by Rutgers indicate that the mixtures now being sold, containing 60% of "448," are 50-60 per cent as long-lasting as "6-12" against Jersey salt marsh mosquitoes. "448" is colorless, a solvent for nitrocellulose, and has a slight phenol-like odor. Toxicological tests are incomplete.

FUTURE DEVELOPMENTS

The ideal repellent would be one which would act at a considerable distance so that material applied on the hand, for example, would protect the whole body, or a few ounces applied on one wall would keep all insects out of the room. Whether or not such a repellent will ever be developed is open to question; it may be impossible to secure a sufficient volatility for distant effect without sacrificing the long lasting properties of the repellent. Nevertheless, as the fundamental scientific research proceeds and as more is learned about the physiology of insects and of the mechanisms of repellency, it may be possible to design even better repellents than the products meeting with such success in the civilian market today.



Left: Dr. Harry Haynes—Research Fellow at the New Jersey Agricultural Experiment Station, Rutgers University, checking repellency times of a treated arm in a cage of mosquitoes. Right: Dr. Philip Granett, Assistant Research specialist in Entomology at the New Jersey Agricultural Station, Rutgers University, and Walter Henderson, Inspector, Ocean County Mosquito Commission, field testing a repellent. One leg is treated and the other is not. More than 8000 compounds have been so evaluated in the past few years.

Footnotes to the BIKINI BOMBS

by ROBERT L. TAYLOR*
Editor, Chemical Industries

RADIOACTIVITY PROVED TO BE A potentially more damaging weapon than blast effects in the atomic bomb tests at Bikini. One of the major lessons learned was the need for new methods of protection against lethal radiation. The tests provided opportunity to expose many materials to fission rays.

BEHIND the drama and spectacle of the atomic bomb tests at Bikini this summer was one of the most elaborate and carefully planned scientific experiments ever conducted. Months of preparation by some 37,000 scientists and Army and Navy personnel went into setting the stage of the giant laboratory. Thousands of instruments, ranging from empty oil drums used as pressure indicators to complicated electronic devices for supersonic measurements, were part of a giant master plan to measure every aspect of an atomic explosion and its effects that could possibly be measured.

Although results were chiefly of military value, as intended, the tests produced some byproduct information of interest to many branches of science, including chemistry. While a great deal of this scientific information will never be made public for security reasons, there was enough to be had from observation and preliminary reports to provide a bit more informative reading for chemical people than the general press dispatches.

It apparently has not yet been determined with finality whether atomic fission is a physical or a chemical phenomenon; for practical purposes perhaps it doesn't make too much difference. But from a chemical standpoint at Bikini, it was the fission reaction, itself and the nature and effects of its radioactive products that were at once the most interesting and the most terrifying aspects of the demonstration. The Navy, too, found them sufficiently impressive to be "more than ever struck by the atomic bomb's unique and terrible power as a weapon of poison warfare." This conclusion, I am convinced, could be stated infinitely more forcefully without danger of exaggeration.

The sinister nature of radioactivity is emphasized by this warning that was included in the printed information given to observers of the Crossroads tests:

"You are never aware of the dangers from radioactivity through the normal channels of your five senses. When you do become aware of them, your physical degeneration has already started. You can do nothing but wait for it to end."

In both tests the lethal range of the radioactivity loosed by the blasts was greater than that of the concussion. Under battle conditions, in other words, more ships would have been knocked out by the effects of radioactivity on the crews than by sinking or other damage from concussion. It is estimated that vessels within a mile of an atomic bomb air burst would be written off as combat vessels because of crew casualties.

RADIOLOGICAL EFFECTS

To fully understand the radiological effects of the bomb it is necessary to know something about how these effects were created. The radioactivity produced by an atomic explosion is from two different sources: (1) the fission products from the splitting of uranium or plutonium, which consist of highly radioactive lower metals and their oxides, and (2) induced radioactivity in the materials struck by the gamma rays and neutrons emitted by the explosion, such as the iron in the ships, food, supplies, salt in the sea water, even the fish—almost everything, in fact, exposed to the direct rays of the blast.

It was the presence of these two source-types of radioactivity—that from the fission products and the induced—in different amounts that accounted for the different intensity and life of the radioactivity remaining after the two blasts. After the air-bomb explosion the induced radioactivity in the ships and water was very high because they were exposed directly to the blast radiation. The effect of the fission products apparently was not great because the ships "cooled off" (radiologically speaking) within a day or two. If there had been any appreciable deposition of fission products on them, they would have remained hot several times as long. This is because the radioactive half lives* of the fission products are much longer than the half life of the iron in the ships or of sodium, which is the principal carrier of radioactivity in sea water. In the air-bomb explosion it is believed that most of the fission products went up in the atomic cloud and were scattered rapidly in the upper air currents. (Slightly radioactive air particles were detected in California two weeks after the shallow water explosion. Which test they were from is not known.)

In the shallow water blast, on the other hand, the lingering radioactivity was much greater, apparently because a large part of the fission products were entrained in the water and spray and thrown over the target ships. Thus while the induced radioactivity, which was probably less because of the shielding effect of the water, decayed at the same rate as after the air blast, the ships and the water remained hot for five to ten days as a result of the longer-lived fission products they were carrying. While the size of neither bomb was disclosed, other than to say that they were equivalent to the one dropped at Nagasaki, from the earlier official statement that they were roughly equivalent to 20,000 tons of TNT it has been calculated back on an energy conversion basis, assuming 90 per cent fission efficiency, that the Bikini bombs should each have produced about 35 ounces of fission products.

Samples of both the cloud and the water were analyzed quantitatively for fission products after both tests in an effort to

* Mr. Taylor attended the second atomic bomb test at Bikini as official press correspondent for *Chemical Industries* and other Maclean-Hunter publications in the United States and Canada.

* A half life is the length of time required for a substance to lose half its radioactive charge. It is the same at all times for a given element and has nothing to do with the magnitude of the original charge. For example, sodium, which is the principal carrier of radioactivity in sea water, has a half life of about 15 hours. This means that whatever the amount of radioactivity acquired from the blast by the sodium, half of it disappeared in 15 hours. Of the amount remaining, half of that disappeared in the next 15 hours, and so on until there was no longer enough left to be dangerous. The various fission products of the bomb have half lives ranging from a few seconds to several years.

get a more accurate determination of fission efficiency, but unfortunately the results are restricted. Even allowing for a sizable error in the 35-ounce figure for the fission products, the quantity is so small in relation to the area it is capable of contaminating, that we can class atomic fission products as one of the most powerful lethal poisons known. Forty square miles of water in Bikini lagoon were still too dangerous to enter 24 hours after the explosion, and some of the target ships were too hot to board as long as eleven days afterward. Between 70 and 90 per cent of the lingering radioactivity after the shallow water burst was estimated by radiological experts to be from the fission products. Radioactive material in the sea-water, it was found, tended to cling to rust, barnacles and seaweed on the ships' bottoms.

Several methods were tried to reduce the radioactivity of the vessels, with only minor success. The great need for knowledge on the subject of decontamination was one of the things emphasized by the tests.

A washdown with uncontaminated water from a fireboat hose 48 hours after the explosion decreased the radioactivity of the destroyer Hughes from 2½ Roentgens per 24 hours at 40 feet to 1½ R's per 24 hours, which was still too hot to board. A Foamite wash showed no appreciable improvement over the plain seawater. Later, used coffee grounds and ground corncobs were mixed in the water stream to act as a mild abrasive in the hope of rubbing off the tenacious fission products, but the results were not announced.

Other decontamination methods are being tried on a laboratory scale at one of the government radiation laboratories. An accidental discovery at Bikini may help in this work: It was noticed by Geiger-counter patrol men that wherever an oil slick occurred on the water in the target area, the oil was much more radioactive than the surrounding water area. In addition, water samples taken from immediately under the slick showed less radioactivity than the surrounding water. The oil apparently had extracted some of the fission products from the water and was carrying them along with it.

Although other chemical means of decontamination are being tried, their use seems limited to cases where the radioactive material can be washed or dissolved away, which means that the radioactivity is simply being dispersed over a greater area or transferred to a medium that can be easily removed and disposed of. As yet there are no known means of decontamination by hastening decay of radioactive materials or by counteracting their radiation, possibilities which, if they ever materialize, would seem to be more likely to involve physical than chemical principles.

The Crossroads tests were conducted with strict limits on the amount of radioactivity to which any participant or observer could be exposed. The official maximum tolerance was set at the extremely conservative figure of 0.1 R's per 24 hours, which is about what you get when you have your chest X-rayed. You could, in fact, be exposed to this intensity every day of your life without any ill effects. Only four participants were known to have been exposed to more than tolerance, the worst case being four times tolerance. None showed any ill effects.

The animals exposed on the decks of the target ships told a different story, however—one whose portents for the crews of atom-bombed ships were not pleasant to contemplate. Of a total of 3,353 goats, pigs and rats exposed to the air-exploded bomb, at varying distances and under various conditions, 30 per cent were found dead when the ships were boarded 24 to 48 hours after the blast; 9 per cent more died within three weeks. Without information as to distances from the explosion, these figures are not too revealing, but their significance becomes clear when added to the estimate of radiological experts that at 1,000 feet an atomic burst should score 100 per cent radiation casualties on members of a crew above decks; 50 per cent below decks. Even then the remaining 50 per cent would somehow have to shield themselves from the lingering radioactivity in the ship, its equipment, and even the food. The only bright note in the whole picture is that the stricken ship might still be able to maintain its fresh water supply. Some of the ships in the observer fleet at Bikini were known to be taking radioactive seawater into their evaporators but the condensate produced was well under safe limits for human consumption. The radioactivity remained in the salt in the residues.

It has been noted that the effects of radiation were delayed in many of the animals exposed on the target ships. Some showed no effects for as long as two weeks, only then to weaken, undergo loss of hair, deterioration of bone structure, decrease in clotting power of the blood, and loss of white blood cells to the point where the body was no longer able to

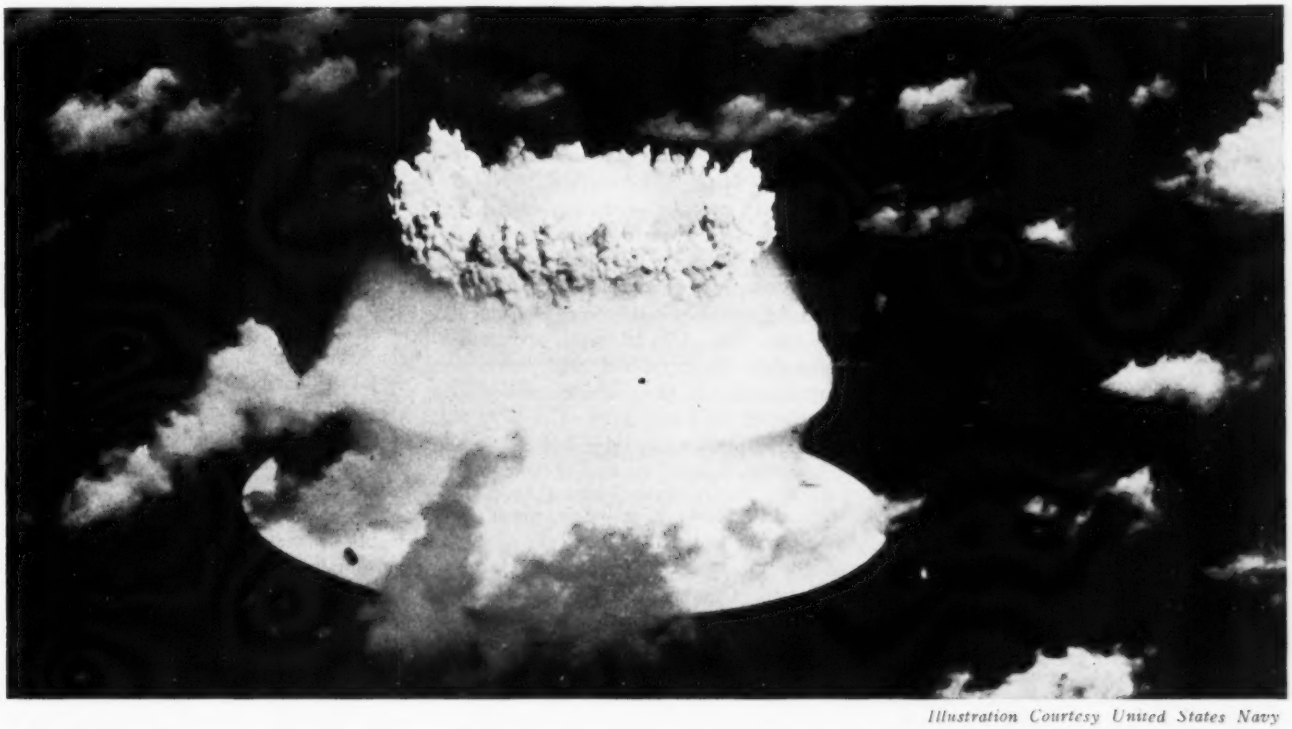


Illustration Courtesy United States Navy

Air view of water, steam and spray boiling skyward from Bikini lagoon, at an early stage in the release of atomic energy during Test Baker.

combat disease and infection. A good many of these cases responded to blood transfusions and penicillin, according to the medical officers in charge.

As yet, the only known protection against radioactivity—or gamma radiation—is several inches of solid lead—or a half mile of air, water or earth. Obviously none of these is very practical for protecting a man at a battle station on a warship. A number of types of protective clothing were exposed on the decks of the target ships and on the animals, but these were mainly for protection against the flash and heat of the bomb. Observers agreed that one of the major lessons learned from the tests was the need for an effective means of protecting ships and their crews from radioactivity.

The heat effects of the bomb were not as great as expected. While momentary temperatures at the center of the blast were calculated to be millions of degrees, thermometers on vessels 1,000 feet away were reported to have registered a maximum of 125 degrees F. The decks of some of the inner ring of target ships in the air explosion were blistered, and a number of fires were started in combustible material such as aviation gasoline and live explosives intentionally exposed on the decks of some of the closest ships. A number of paint panels were exposed, and, as would be expected, the light and glossy coats reflected more of the heat, whereas dark and flat finishes tended to blister.

Various metals, foods, dyes, fabrics, glass, paper, and furs, were also exposed to determine the effects on them of the light and radiation of the bomb, as were drugs and medical supplies, methyl bromide, methyl chloride, hexachlorethane, screening smokes, lubricants, and cylinders of compressed air, oxygen and other gases. The Chemical Warfare Service exposed smoke grenades, gas shells, incendiary bombs, and flash proof and protective clothing.

The Department of Agriculture exposed an unusually interesting collection of seeds, molds, insects, and plant and animal parasites. This included a special strain of *aspergillis niger* that has been studied a great deal in the fermentation of citric and gluconic acids. The insect collection was comprised of beetles, weevils, moths, mosquito eggs, termites, bedbugs, ticks, chicken mites and cheese mites.

The Crossroads tests have been called the most instrumented experiment ever carried out. Whether this distinction is factually correct I don't know, but it is true that thousands of instruments of all types were used for hundreds of measurements in both tests. They included a number of types of pressure gauges and rupture diaphragms to record air blast, underwater pressures and shock wave velocity; devices on the ships themselves to measure torsion, bending of members, deflection, hull pressures, amount of roll and pitch, heating by radiation, shock effects on the degaussing system; cloud filters on aircraft to get continuous measurements of radioactivity in the air; numerous types of photographic equipment; and various oceanographic instruments to record wave motion, water currents, size of depression in water, pressure on bottom of lagoon. Even the radar reflective properties of the atomic cloud were measured. A radiometry section obtained the spectral distribution of the flash, intensity of the flash, and total radiant energy emitted by the flash.

Operation Crossroads taught us much about the effect of the atomic bomb on naval targets and about the radiological characteristics of the bomb. But while it added to our store of knowledge about what the bomb will do, we shall be foolhardy indeed if we let familiarity dull our respect for this mighty weapon. It remains by far the most powerful and devastating physical force ever created by man. Anyone who saw the staggering sight of ten million tons of water being lifted a mile into the air, and the more than half-dozen sinking and listing ships in its wake, will not soon forget the display of power packed in one small atomic capsule. Crossroads, and what it demonstrated, is another compelling argument for permanent peace and an effective system for world control of atomic energy.

Bikini Briefs

◆ It took the sound and pressure front of the explosion almost a minute to reach the observer ships ten miles away. The only sensation at that distance was a dull boom accompanied by an instantaneous rush of air roughly equivalent to a 20 or 30 mile wind.

◆ Illustrative of the "intricacy" of some of the recording devices used in this "most instrumented experiment ever conducted" was the Bikini wave meter. Designed to measure the height of any waves that might sweep over Bikini Island, this complicated gadget consisted of a vertical pole to which open beer cans were tied at one-foot intervals. Height of the wave was to be recorded by the number of beer cans filled with sea water.

◆ One group of observers touring the target array after Test Baker was greatly mystified by a coating of frothy, muddy looking material that covered a "hot" destroyer from stem to stern, as if laid on by a giant wave. About the time the conclusion had been reached (from a distance of 40 yards) that it must be mud and pulverized coral thrown up from the bottom of the lagoon, a patrol boat drew up and volunteered the information that it was Foamite. Someone had had the idea of trying out Foamite as a decontamination wash to reduce radioactivity. Results of the experiment were inconclusive.

◆ A cache of 10,000 pounds of refrigerated Bikini fish was stored near the target site aboard a Navy-manned California tuna clipper, not for eating, but for comparison with specimens of their bomb-blasted relatives as part of the work of determining radiation effects.

◆ The shallow-water blast actually made a depression in the coral bottom of the lagoon. Depth of the lagoon in the target area was about 180 feet, and the bomb is believed to have been suspended some 25 or 30 feet beneath the surface. The size and contour of the depression made in the water by the explosion was measured by many air-sensitive instruments placed at regular intervals and levels throughout the water basin underneath the target ships. By plotting the number and location of the instruments exposed to air by the explosion, the size and shape of the water depression was obtained.

◆ Penicillin was effective in pinch hitting for the lost white blood cells of some of the animals exposed to the bomb's radiation. One effect of the gamma rays given off by atomic fission is to destroy the white cells in the blood, thus reducing the body's natural resistance to disease and infection. Penicillin administered to some of the test animals with low white blood counts after exposure appeared to increase their resistance to bacterial infection.

◆ DDT has become a necessity of life in the Marshall Islands. King Juda, formerly monarch of Bikini but now of nearby Rongerik, was invited to view the bomb tests from Admiral Blandy's flagship, the Mt. McKinley. While aboard "The Mount," Juda was asked by a Navy officer how his people liked Rongerik now. "Rongerik okay," he replied, "but too many flies, not enough DDT." The U. S. Navy immediately dispatched DDT reinforcements to the Island of Rongerik.

◆ Official maximum allowable exposure to radioactivity for those participating in the tests was 0.1 Roentgen per 24 hours, or about as large a dose as you get when you have your chest X-rayed. There were no human casualties or accidents resulting from either of the tests. Only four persons were known to have been exposed to more than the tolerance amount of radioactivity. The worst of these was a Geiger-counter man who fell overboard unnoticed from one of the small boats taking samples of the radioactive water in the lagoon the day after Test Able. He was in the water an hour and a half before he was picked up, at which time he was suffering from fright and shock but was otherwise unharmed. The official maximum exposure allowed a large safety factor.

How Statistical Methods Can Improve Chemical Processes

by WILLIAM R. PABST*, Washington, D. C.

MODERN STATISTICAL METHODS provide a too little used tool for quantitative measurements. Their use to provide the structure and background for the acceptance controls for the Armed Forces during the War and the ability, through their proper application to cut costs, to reduce scrap and furnish a more accurate picture of plant production and experimental tests in such widely divergent fields as the metal-working industries, the manufacture of penicillin, and in the routine control of chemical analyses holds promise of cost-saving application in many other places.

APPLICATION of modern statistical methods provides a new and very valuable tool for the analysis of data whether it be gathered in the research laboratory or the day to day operation of the plant. The value of this tool lies in the fact that in many cases it does not require use of the classical laboratory method of varying one factor at a time while all others are held constant. It permits evaluation of variables from data gathered on plant operation or in the laboratory where more than one factor varies at a time. Thus in testing fuses for projectiles, it is necessary that the fuses and the projectile be tested at the same time as it is impossible to test one without the other.

These methods were developed primarily by R. A. Fisher at Rothansted Experiment Station in the field of agriculture, where the classical laboratory methods of varying one factor at a time could not be applied. In measuring the effect of seed differences or fertilizer treatments, the varying influences of weather, moisture, and field variations had to be controlled or randomized in order that these might not ruin the experiment. Fisher found that his methods could not only substitute for the one-factor-at-a-time methods, but actually improved upon them. The advantages of his methods are:

1. Make the tests more economical and efficient, since as much information is derived about each of several factors as if the whole test were devoted to a single factor.
2. Broaden the range over which the conclusions might be generalized.
3. Make it possible to compute interaction among the factors.

These methods have been applied increasingly to industrial analyses in the chemical industry as well as many others. The testing of production from a plant or factory constitutes a type of continuing experiment in which many factors cannot be controlled, but which must be measured in analyzing the resulting data for process control. One of the best known and easily applied of these statistical methods is quality control. This is an hour-by-hour experiment, testing production at intervals of time or by lots in order to determine if the fluctuations from a period to period are greater than might be expected from the factors of variations observed in the past period.

QUALITY CONTROL

Statistical quality control is a method of identifying and eliminating unwanted causes of variation in a repetitive process, such as the day-to-day operations of a plant. It is based on discovery of the unit-to-unit variations inherent in an operation or process. A test of significance is the secret of this industrial control. This test is designed to indicate when changes in the process occur and to provide a determination of the importance of such changes. So armed, management can tell when the process is under control and when and where to look for trouble.

The advantages of quality control methods in the establishment of process control on an operation are:

1. Prediction of impending trouble on the basis of trends in quality characteristics.
2. Saving of scrap by correcting the process before a poor product results.
3. Reduction in required inspection.
4. Increased knowledge of the process in determining the plant capacity.

A plant manager, after two months' experience with quality control methods, recently said, "Quality control gives everyone in the plant a chance to play on the same team—everybody can see at a glance what the quality of a particular product is and how it has developed." The manager also indicated that during the period of quality control that plant morale had been greatly increased.

American industry, following the lead of the Bell Telephone Co., has recognized the importance of quality control principles. During the war, quality control became the key to process controls for most war-time producers and provided the structure and background for the acceptance controls exercised by the Armed Forces. The standard inspection plans were primarily based on quality control principles. It has been used in the manufacture of penicillin, for control of the chemical composition of explosives, maintenance of weight tolerances of primer caps, and in the control of routine chemical analyses.[1] It is equally applicable to mass production processes or batch operation. The War Production Board reports show that these methods have been easily applied, cut costs, reduced scrap, increased morale and furnished a record of experience of the capabilities of the processes, machinery and manpower required for processing.[2]

QUALITY CONTROL CHART

The quality control chart, the heart of statistical quality control, is a graph of the average and range (or standard deviation) of periodic samples. It shows the trend of quality characteristics with time, and by the control limits indicated on the chart serves as a basis of quality judgment. The control limits are calculated by means of a mathematical relationship between ranges and averages which is worked out in detail in Table 1, "Factors for Computing Control Chart Lines" in "Control Chart Method of Analysis and

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Presentation of Data," published by the American Standards Association.[3]

The control chart is simple enough. It attempts to sort out the variation inherent in the process itself from the variation induced by outside and assignable causes. As long as the process is subjected only to those factors relating to within process variation, the results can be expected to fall in random order within established limits. In practice the average range or standard deviation of a consecutive series of samples taken from production is used as a measure of the variation within the process. From this measure of internal process variation, control limits are assigned so that the average and range of successive samples will fall within these limits, if the process is under control. Averages or ranges outside such limits provide evidence that additional causes of variation are present. It then becomes the technicians' task to find the "assignable" causes of variation and to control them. Thus the control chart brings to light those changes in the process which could not have arisen from chance alone.

For example, the use of control charts enabled contractors to control the charge weight of primer caps. This was accomplished by setting up control charts based on five samples taken from each half hour's production from each operation.

The process of rolling a primer mix into a plate requires considerable skill, for the primer-mix must be moistened sufficiently to make it "work" easily, but if it becomes too wet the dried weight is less than that required. Too small a charge weight causes loss of brissance: too large a charge weight decreases sensitivity. A plate of 100 caps is rolled every few minutes, the caps are pressed out and then dried.

When quality control was first established on this operation, it was known that there was great variability in charge weights. But how much of the variability was inherent in the process itself and how much was the result of assignable causes was not known. Use of a quality control chart showed the most of the variation came from assignable causes; namely, differences in skill and training of operators, differences in moisture content of the mix, variations in the mix composition, etc. After quality control was fully established, variation from assignable causes was largely eliminated.

For the quality control charts, a sample was selected from each plate, and from these combined samples, a final sample of five units for each half hours' production for each operator was taken as indicative of production during that time. The average weight of the five units in the sample was then computed and the range from the highest to the lowest in the sample. The data obtained from the weighing of these samples on April 26 recorded as shown in Table I.

The chart of these data as shown represents a historical record of production. However, after 15-20 samples had been charted, control lines were established from these data and applied on the chart, providing both a test of the homogeneity of the lots in the base period and a guide for future production.

Based on the 28 observations from the first day, the control limits were calculated. The average of the averages ($\bar{\bar{X}}$) was found to be .085, and the average of the ranges ($\bar{R}$) to be .125. From the table of factors for control limits (Table I of reference 2), the control limits for the averages are found to be

$$\bar{\bar{X}} \pm A_2 \bar{R}$$

where A_2 for a sample of 5 is given as 5.77. Therefore the control limits are

$$.085 \pm .577 \times .125 = .085 \pm .072$$

Thus the upper control limit for averages is .157 and the lower limit .013. The control limits for the ranges as given by the factors from the above tables are found to be

Upper range limit $= D_4\bar{R}$ or $2.114 \times .125 = .264$

Lower range limit $= D_3\bar{R}$ or $0.0 \times .125 = .0$

The chart shows that production on the 26th was homogeneous since the averages and the ranges were well within control limits. Production was also within specification limits. The averages from successive samples on the 26th cluster closely about the grand mean, and hence that no "assignable cause" of variation other than the expected within process variation was present. However on the 27th trouble was experienced at 9:30, 10:00 and 11:30 in obtaining charge weights above the upper control limits. Cause of the trouble was found to be the absence of sufficient moisture in the mix, which left the dried weight of the material produced during these periods too high. The operator was able to correct this trouble, and the average charge weight was brought back into control.

This chart illustrates how the informa-

GLOSSARY OF TERMS

SAMPLE — A group of units selected, usually at random, from a lot or population to provide an estimate of the distribution. Accuracy depends mostly on the size of the sample and not on the size of the lot.

POPULATION or LOT is the universe of measurements from which the sample is drawn and about which quality decisions are made.

VARIANCE — A measure of variability defined mathematically as the squares of the deviations from a mean of a sample and dividing by the number (less one) in the sample.

STANDARD DEVIATION — The square root of the variance which is the most customary measure of variability of a distribution.

RANGE is the difference between the largest and the smallest item in a sample and is usually used in control charts when the number of samples taken is ten or less.

ASSIGNABLE CAUSES — Assignable causes are those causes of variation which do not appear in the unit-to-unit variation of an item and cannot be accounted for by the inherent variation.

SIGNIFICANCE, TEST OF — A measure of the probability that an event could arise from chance causes alone. A difference between the averages of two events is significant, when it is deemed probable (less than one chance in twenty) that such a difference could arise from chance causes without a real difference in the lots.

CONTROL LIMITS are the limits of the range of the quality average within which successive values are expected to fall in the absence of assignable causes.

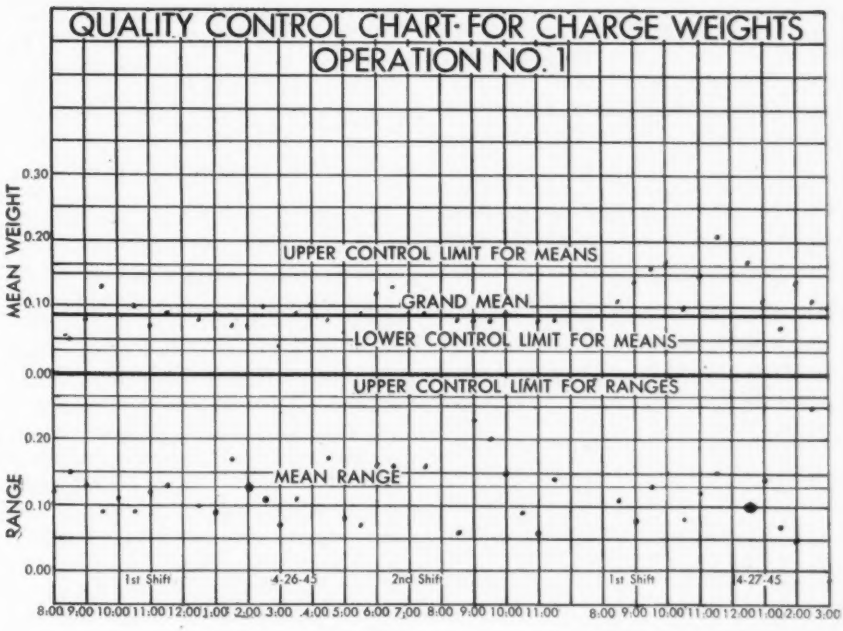
IN CONTROL is a situation in which the means of successive samples do not differ from the base period mean by more than chance.

tion made available in relation to the control limits not only helps management know that its product is consistent and uniform, but also guides the operator in finding the assignable causes for variations which may occur. As more information is obtained from the process, the control chart limits must be recalculated to adjust for gradual changes. The control chart indicates the limits for the first type of variation, that arising from chance alone; any variations in a sample beyond those limits will in all probability arise from a real difference in the underlying group from which the sample is taken.[4,5]

Simplifications of the quality control test can be made under circumstances when uniformity from one average to another is not essential so long as assurance is obtained that practically all the individuals in a period are within specification limits.

For instance in the case of charge weights, it might not have been important to control the minor variations from one half-hour to another and from one shift to another as long as all individual charge weights fell between —0.005 and 0.250. In this case modified upper and lower control limits might have been calculated by subtracting $A_2\bar{R}$ from the upper specification limit and adding $A_2\bar{R}$ to the lower one, producing limits of 0.022 and 0.178. This test does not examine whether the material represented by the different averages is essentially the same, but whether any of the averages fall close enough to the specification so that there is suspicion that individual units in the material represented by the averages fall outside the specification limits.

The value of the control chart is that it provides a continuing experiment, designed to tell, with due consideration to the variability of the process, whether



there is a difference between an operator's results from one half hour to another, or whether there is a difference between operators, or between shifts.

It should be noted that the basis of every statistical comparison is the detection of the unassigned or inherent variation of the value under consideration; without which the significance of a comparison between one group of objects and another cannot be determined. Thus in comparing two groups whether it be charge weights, nitrocellulose content or ignition delay times, there are two possible sources of difference when test is based upon a sample; first, the sampling difference that might be expected to arise from chance alone with respect to variability within the groups; and second, possible real differences in the things themselves.

ANALYSIS OF VARIANCE

The analysis of variance permits a division of the total variation of a quality

TABLE I. Charge Wts. (oz.)

26 April

	1st Shift (First Term eliminated to ease calculation)													*2nd Shift*						
Oper. 1	8:30	9:00	9:30	10:00	10:30	11:00	11:30	12:30	1:00	1:30	2:00	2:30	3:00	3:00	4:30	5:00	5:30	6:00	6:30	7:00	7:30
	.06	.04	.18	.05	.11	.13	.06	.09	.05	.11	.15	.15	—.01	.11	.04	.06	.13	.02	.06	.02	—.01
	.04	.02	.09	.09	.10	.11	.05	.10	.04	.94	.10	.11	.06	.13	.06	.02	.06	.13	.09	.05	.09
	.09	.10	.13	.15	—.04	.04	.06	.11	.11	.10	.04	.10	.06	.10	.05	.02	.09	.16	.22	.15	.16
	—.04	.15	.13	.16	.19	.01	.18	.09	.10	.09	.02	.09	.05	.11	.21	.09	.06	.10	.11	.11	.06
	.11	.09	.10	.15	.13	.04	.10	.01	.13	.09	.06	.04	.04	.02	.05	.10	.09	.18	.16	.10	.15
Mean.	.05	.08	.13	.12	.10	.07	.09	.08	.09	.07	.07	.10	.04	.09	.08	.06	.09	.12	.13	.09	.09
Max.	.11	.15	.18	.16	.19	.13	.18	.11	.13	.11	.15	.15	.06	.13	.21	.10	.13	.18	.22	.15	.15
Min.	—.04	.02	.09	.05	—.04	.01	.05	.01	.04	.94	.02	.15	.06	.13	.04	.02	.06	.02	.06	.02	—.01
Range	.15	.13	.09	.11	.23	.12	.13	.10	.09	.17	.13	.11	.07	.11	.17	.08	.07	.16	.16	.13	.16

TABLE II. Nitrocellulose Determination of 5 Unique Randomly Selected Units Taken From 13 Consecutive Rocket Propellant Grain Lots

(In percentages — first two numbers omitted to simplify calculations)

No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No.9	No. 10	No. 11	No. 12	No. 13
70	49	67	46	32	81	24	70	39	29	23	36	21
76	48	80	71	46	36	05	38	38	47	28	12	28
56	39	14	53	55	62	54	20	55	10	49	58	38
66	51	59	27	54	38	31	52	33	37	17	33	—29
73	53	56	37	37	39	09	29	38	37	19	34	—16

TABLE III. Calculation Sheet—Nitrocellulose Content

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Sum of X's $= \epsilon X$	341	240	276	234	224	256	123	209	203	160	136	173	42	2617
AVERAGE $\frac{\epsilon x}{N}$	62.8	48.0	55.2	46.8	44.8	51.2	24.6	41.8	40.6	32.0	27.2	34.6	8.4	40.2
RANGE	20	14	66	44	23	45	49	50	22	57	32	46	67	39.6
Sum of X^2s ϵx^2	23497	11636	17702	12064	10450	14666	4829	10289	8523	5888	4364	7049	3766	134723
$\frac{(\text{Sum of Xs})^2}{(\epsilon X)^2}$	176281	56700	76176	54756	50176	65536	15129	43681	41209	25600	18496	29929	1764	6848689
$\frac{(\epsilon X)^2}{N}$	23256	11520	15235	10951	10035	13107	3026	8936	8242	5120	2699	5486	353	105,364
$\epsilon X^2 - \frac{(\epsilon X)^2}{N}$	241	116	2467	1113	415	1559	1803	1553	281	768	665	1063	3413	29,359
$\epsilon X^2 - \frac{(\epsilon X)^2}{N}$	60.3	29.6	616.7	278.3	103.7	389.7	450.7	388.3	70.3	192.0	166.3	265.7	852.6	458.73
Variance $= \sigma$														
Standard Deviation $= \sigma$	7.8	5.4	24.8	16.7	10.2	19.7	21.2	19.7	8.4	13.9	12.9	16.3	29.2	21.4

characteristic from a series of lots into the variations arising from the variations within the lots and the variations arising from the differences between lots. The comparison of the variations between lots with that within lots tests the significance of the difference between lots. This technique was used, for example, to determine whether there was a significant difference in the nitrocellulose content of rocket propellant powder among 13 consecutive lots.

For the test five units taken at random from each of 13 lots were analysed with results shown in Table II.

The question was whether there was a significant difference between the lots so that larger lot sizes might be specified without reducing the homogeneity of the lots. The assumption is made that the departure from normality of these percentages is not marked since the total percentage is in the neighborhood of 50% and since only the third and fourth places are used in this analysis.

The calculations necessary for the analysis of variance are as follows: the details being shown in Table III.[7,8]

(1) Square the individuals and add
$(70)^2 + (49)^2 + (67)^2 + \ldots = 134{,}453$

(2) Obtain the total for each column, square these totals, divide by the number of individuals in each column, and add together.
$(341)^2 + (240)^2 + (276)^2 + \ldots/5 = 119{,}266$

(3) Obtain the grand total for all individuals, square this grand total and divide by the total number of individuals
$(2617)^2 / 65 = 105{,}364$

A table for the analysis of variance can then be formed as shown in Table IV.

TABLE IV. Analysis of Variance

Source of Variance	*Sum-of squares*	*Degrees of Freedom*	*Mean Square*
Between Lots	(2)—(3) = 13,902	13—1 = 12	1158
Within Lots	(1)—(3) = 29,089	13 × (5—1) = 52	559

The mean squares are the squares of the standard deviations calculated in the one case from the lot averages about the grand means and in the other from the individual variations about each lot average. The mean square attributable to the variations between lots can then be compared directly to the mean square attributable to the variation within lots, and the results interpreted by means of Fisher's "F" or variance ratio test.

In this case

$$F = 1158/559 = 2.07$$

The table of F values has been worked out and provides an estimate of the probabilities associated with the ratio of one variance obtained with n_1 degrees of freedom to another variance obtained with n_2 degrees of freedom. It shows that for the degrees of freedom in this case, an F value as large as 1.96 could be expected 5% of the time and F value as large as 2.56 could be expected only 1 per cent of the time.[9] The F value observed of 2.07 exceeds the 5% value and therefore must be considered significant. This means that differences between lots as great as those observed could not be expected to arise from chance causes resulting from the within lot variability.

In practical terms, this means that the nitrocellulose content of the different lots is significantly different: that is, the lot averages differ more than might be expected from the average variation within the lots as judged from the samples. The action dictated was to analyse the cause of excessive variation between the lots with the ultimate objective of getting larger lot sizes without reducing the homogeneity of the lots.

Had the nitrocellulose data been used to set up control chart limits, the control chart limits for the averages would be found to be 62.4 and 16.8. These limits as in the case of those for charge weights are calculated from the grand average for the lots, shown in the Calculation Sheet as 40.2 plus and minus the A_2 factor times the average range, or .577 times 39.6. When these limits are applied to the data, it is noted that lots No. 1 and No. 13 fall outside these limits, indicating significant differences among the averages and showing that the material is not homogeneous. Of course, this step is usually the first in establishing quality control charts since it provides a basis for comparison of future production. The important point here is that quality control makes possible the same broad conclusions as more refined statistical measures. However, the degree of significance of the differences is not obtained with the control chart, whereas it is obtained with the analysis of variance. The analysis of variance thus makes the test of uniformity among the lot averages more sensitive and precise.

THE LIKELIHOOD TEST

The likelihood test is a means of comparing a number of measures of variance in order to test whether they are homogeneous from lot to lot. By use of this test it was possible to show that although the aforementioned 13 lots of nitrocellulose differed in their averages, they did not differ significantly in their variability within the lots. Usually it is wise to use the likelihood test before the analysis of variance, for if the lots are heterogeneous in their variance, there is little more that can be done. This likelihood test thus supplements the analysis of variance test.

The formula for the likelihood coefficient calculated for 13 lots is:

$$L = \frac{\sqrt[13]{s_1^2 \times s_2^2 \times s_3^2 \cdots s_{13}^2}}{\frac{1}{13}\left(s_1^2 + s_2^2 + s_3^2 \cdots s_{13}^2\right)}$$

For the 13 lots above the likelihood coefficient L is found to be .69 and the probability associated with an L of .69 calculated from 13 lots of 5 each is approximately 10%. This probability is obtained directly from the table of the distribution of L.[9] This means that the likelihood coefficient as small as this would happen fairly frequently from chance variation. Therefore on the basis of the 13 samples there is no reason to suspect that the variances of the 13 lots are significantly different.

The analysis of variance and the likelihood test may be considered respectively as akin to the control limits for averages and the control limits for ranges as given on control charts. It has been shown that the analysis of variance gives the same answer as the control limits on the averages for these 13 lots. When control limits on the ranges are calculated, essentially the same conclusions as that of the likelihood test is derived.

The upper range limit, calculated by the method used in the charge weight example, is RD_4 or 39.6 times 2.114 which equals 83.5. As shown on the calculation sheet no single range exceeds this limit, and thus there is no reason to believe that the lots are heterogeneous so far as their internal variability is concerned. The range chart furnishes the same answer, but the likelihood test makes possible a precise statement of the associated probability.

THE T-TEST

Nitrocellulose determinations based on a blended composite sample had previously been made for the aforementioned 13 lots. The data analysed was for five separate determinations of nitrocellulose made on unblended units taken from the same lots. The question thus arises as to whether the blended determination in each lot agreed with the information obtained from the five units from each lot. The t-test of significance answers this question.[10]

The "t" test is a statistical test used for testing the difference between the means of two samples. The value, "t", is derived from the comparison of the difference between two means with the standard error of the difference between the means. In this case the standard error of the means is calculated from the variance within the lots.

In the table of the analysis of variance, the variance within lots was found to be 559. The standard error of the difference between two samples of five is the square root of two times the variance divided by five, or the square root of 239.8. The standard error of the difference between two samples of five each is thus 15.5 The "t" value is the difference between the averages of two samples of five divided by 15.5.

The comparison between the average of the sample of five with the blended determination of each lot can then be made, on the assumption that the blended sample represents the mixing of five units and that the determination error can be considered negligible. The following table presents the averages of the samples of five from each of the 13 lots, the corresponding blended sample determination, the difference between them and the "t" value derived by dividing the difference by the standard error of the difference between two samples of five, as shown in Table V.

The values of "t" are then compared with the distribution of "t" as given in the "t" table, for 52 degrees of freedom (the number from which the variance is estimated as given in the analysis of variance table).[12]

The "t" table indicates that a value of t of 2.01 is significant at the 5% level and a value of 2.68 at the 1% level. Only the t value for lot No. 6 is significant. This means that this composite determination is significantly different from the average determination for this lot and suggests that some error or mistake occurred. In general the composite determinations closely agree with the averages.

For the group as a whole, the comparison between the composite average and the grand averages of the five units is also tested by means of the t test. The difference between the averages is 40.2 — 39.2 or 1.0. The standard error of the difference is determined as before with consideration of the larger sample size, as equal to the square root of twice the variance divided by 65. This equals 4.3. The "t" value is 1.0 divided by 4.3 or .23 which is not significant. Thus with the exception of one lot, the composite determinations do not differ significantly

TABLE V. "t" Valve

Lot	*Unblended Determinations Average of Five* $\bar{X}$	*Determination Blended Sample* $\bar{X}^1$	*Difference* $\bar{X} - \bar{X}^1$	*Standard Error Difference Over* t
1	68.2	85.0	—16.8	1.08
2	48.0	55.0	—07.0	0.45
3	55.2	56.0	—00.8	0.05
4	46.8	35.0	11.8	0.76
5	44.8	56.0	11.2	0.72
6	51.2	10.0	41.2	2.66**
7	24.6	27.0	—02.4	0.15
8	41.8	19.0	22.8	1.47
9	40.6	49.0	—08.4	0.54
10	32.0	21.0	11.0	0.71
11	27.2	48.0	—20.8	1.34
12	34.6	22.0	12.6	0.81
13	08.4	27.0	18.6	1.20
TOTAL	40.2	39.2		

** Significantly different at 1% probability level.

from those made by averaging the samples of five units.

The samples of five units makes possible a comparison among the lots whereas the blended composite determinations provide no information on the within lot variation and hence by themselves make between-lot comparisons impossible.

DESIGN OF AN EXPERIMENT

A problem involved the measurement of ignition times by different methods. The general technique is to measure the time difference between the electrical impulse applied to the igniter leads and the breaking of a contact wire by the explosion of the igniter. Three companies were making igniters, each one was using a slightly different method of stretching the break wire across the igniter; test results showed some difference among companies. The question was raised whether these differences were significant, and if so, if they resulted from differences in test methods or from differences in igniters produced by the different companies.

The practical impulse would be to take a single lot of igniters and to test them by all three methods. But after the test, the question might arise as to whether the same conclusions would have been discovered had other lots been used. In anticipating such questions, it is much easier to test both methods and lots simultaneously so that the conclusions can be generally applied to both lots and methods. The economy of this form of testing is derived from the fact that as much information is obtained about each variable factor as if it were the only one under test. In this case the igniters produced by each of the three companies were tested by the test methods of each of the three companies simultaneously. The average ignition times are

Method	A	(95 igniters)	.0383 seconds
"	B	(96 igniters)	.0387 seconds
"	C	(91 igniters)	.0371 seconds
Lot	A	(119 igniters)	.0391 seconds
"	B1	(25 igniters)	.0397 seconds
"	B2	(32 igniters)	.0389 seconds
"	C	(106 igniters)	.0351 seconds

The analysis of variance table was then calculated as in the manner of the previous nitroglycerine example.

TABLE VI. Analysis of Variance

Source of Variation	*Sum of Squares*	*Degrees of Freedom*	*Mean Square*
Total	.00903	281	
Between Methods	.00041	2	.00021
Between Lots	.00112	3	.00037
Within Methods & Lots — Error	.00750	276	.000027

Significance comparison:

Between methods/within $F = 7.7$ 5% = 19.5
Between lots/within $F = 13.7$ 5% = 8.5
1% = 26.2

The conclusions were:

A. There is no significant difference between the recorded times obtained by the three methods when lot-to-lot variation has been removed from consideration. This conclusion is derived from an F value of 7.7, when a value as large as 19.5 might be expected on the basis of internal variation within lots and methods as frequently as 5%.

B. The difference between lots appears to be significant at the 5% level, since the F value of 13.7 is greater than the value that might be expected by chance 5% of the time. Difference between lots is apparently not significant at the 1% level. Lot C appears low.

SUMMARY

Quality control charts thus are important in so far as they provide a simple test of significance to judge the sameness of repetitive production processes. The quality control test introduces into the factory or laboratory a form of experimental design for the purpose of judging quality differences in a series of samples taken at intervals from production. Whereas the quality control test is suitable for most purposes, it is less sensitive and less precise than more refined statistical tests of significance. Moreover, when quality control charts reveal significant differences, designed experiments are only slightly more difficult to apply. When expense in testing is important and precision of results necessary it is profitable to go beyond the general prescription provided in the quality control charts and to use the more precise tests. Also where experimentation is needed to answer specific questions concerning the use of one test device as against another the one method of production or test as against another, or to appraise new products or new techniques, there is no substitute for the more precise statistical measures, which are available.

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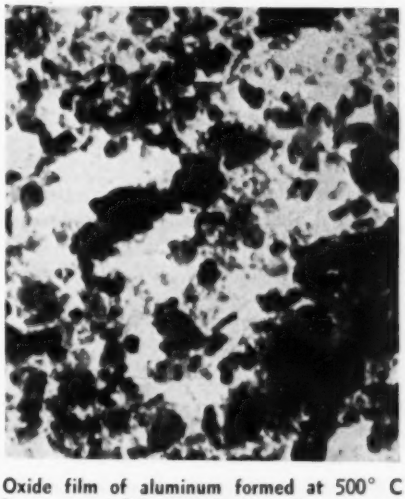
New Tools Used in Corrosion Studies

ONE of the fundamental questions facing chemists, metallurgists, and other research men is the determination of the actual events that take place in the invisible boundary zone formed when metal comes into contact with air, or when any solid reacts with a gas.

Three tools are being used by Westinghouse Electric Corp. to probe the atomic nature of the coatings or oxides that form on metal. They are the electron microscope, the electronic diffraction camera, and the vacuum microbalance. The electron microscope pictures physical appearance of the coating, the diffraction camera determines the chemical nature of the coating and the microbalance measures the rate of growth of the coating.

In operation the electron microscope passes a high voltage beam of electrons through the sample, giving a magnification of 50,000 times, which is recorded on a photographic film. An electron beam is also used in the diffraction camera but in this case it is fired at an angle to the sample from which it ricochets and is recorded on photographic film. The result is a pattern of black and white semicircles formed by electrons bouncing off the different faces of the block-like molecules of the oxide coating. The distance between the rings is a measure of the chemical nature of the oxide.

The vacuum microbalance is a highly sensitive instrument constructed mainly of quartz and hair-like tungsten wire which is enclosed in a vacuum chamber. The sample to be weighed is hung on one end of the balance beam, a counterweight being suspended from the other. A small quantity of oxygen is then admitted into the chamber to form the oxide coating, the change in weight being recorded every few minutes—usually in millionths of a gram. Such techniques will be of great value in all gas-solid reaction studies.



Oxide film of aluminum formed at 500° C by oxygen at 0.1 atmospheres in five minutes. The oxide film was stripped chemically from the metal and an electron diffraction pattern and an electron micrograph were made: magnification about 30,000x on the above electron micrograph.

PLANNED MAINTENANCE

A Means of Increasing Profits

by VIRDEN W. WILSON

THE SUBJECT OF MAINTENANCE is generally deserving of more study in top management circles. Adoption of orderly, pre-planned maintenance schedules increases the effective production of plant units, conserves the manpower necessary for proper maintenance, increases plant safety and enables management to assess overall production costs more closely.

PHYSICAL maintenance of process equipment properly falls under the supervision of the plant engineer and the various maintenance forces within the plant itself. However, management must assume the responsibility for formulation of the broad policy governing such matters as it is apparent from examination of the monetary expenditures on maintenance items that the effectiveness and cost of plant maintenance can exert tremendous influence in the ultimate earnings of the plant. For this reason alone, the development of a sound fundamental philosophy of maintenance, applied in accordance with approved engineering standards, will contribute directly to a healthy statement of profits for the plant involved.

PLANNED MAINTENANCE

Granting that the problem of maintenance is worthy of serious consideration by management and technical staff, the approach to be adopted must then be considered. It is presumed that the plant or plants under consideration have been built in accordance with engineering standards followed at the time of construction, and that the subsequent operation has included normal routine attention to problems of lubrication of mechanical parts, physical and thermal stresses in, and metal loss due to attrition or corrosion on vessels, lines, etc, It is further assumed that management is cognizant of the value of an active safety program, and that this attitude is actively prosecuted by supervisory and operating personnel throughout the organization.

Under these conditions, it is probable that the main factors influencing replacement or repair of equipment are inherent in the type of process employed in the plant. If so, a program of planned maintenance can normally be justified. As the term denotes, planned maintenance is carried out in accordance with an orderly predetermined standard procedure, flexible within reasonable and well-defined limits, which will enable maintenance forces to insure against major plant shutdowns arising from equipment failure.

ADVANTAGES

The advantages of such a systematic procedure may be enumerated as follows:

(1) Control of the time at which the unit is shut down.
(2) Manpower conservation due to foreknowledge of and prior planning for the work to be done.
(3) Increased general plant safety due to periodic inspection and elimination of potentially hazardous plant equipment.
(4) Establishment of true maintenance costs within the plant, permitting a closer check on overall operating and production costs.

With positive control of shutdown periods on manufacturing equipment, maintenance items requiring shutdowns can be carried out during periods when product requirements can be met from inventory or when periods of demand are known to be low, for example, during periods of low seasonal demand. Conversely, a planned schedule of maintenance will minimize the possibility of loss of production during periods of peak demand.

Because of the careful consideration given to the plan for handling over-all shutdowns, the nature of the repairs anticipated, and the general thorough review of manpower requirements for the turnaround on the unit, all of which is done prior to the scheduled shut down, it is possible to anticipate and to eliminate many of the bottle-necks to prompt return of the unit to the production line. If labor requirements for this maintenance are below the available staff in the plant, optimum utilization of this personnel can be obtained by definite assignment of maintenance duties during the inspection and repair. If the labor requirements exceed the available personnel, which is a far more likely case, plant forces can be augmented for the shutdown period. Moreover, the adoption of a program of maintenance will normally allow for prefabrication of any special equipment or replacements during periods when a temporary excess of personnel may be available.

Many potential hazards are eliminated by a planned program of maintenance. In addition to the direct benefits achieved in this manner, an even more important contribution to plant efficiency is the establishment of confidence in equipment. In some cases, this is reflected in elimination of shutdowns during periods of temporary operating difficulties.

The comment has been made that the installation of a system of planned maintenance results in increased maintenance costs. This observation is prompted either from failure to assess items properly in cost accounting prior to the adoption of a plan for maintenance, or from examination of maintenance records over an insufficient period to make a proper evaluation. A planned maintenance program in time permits ultimate utilization of equipment, and will aid in establishing the true physical depreciation of the plant.

The value of a simple properly applied system of cost accounting is apparent, if its flexibility will permit a clear-cut distinction between replacements made on a maintenance basis, and those justified from improvements in the process which may be charged to a capital account. In large plants, where personal contact between office and maintenance forces is infrequent, close cooperation between supervisory personnel in the establishment of a suitable cost accounting system to develop maintence costs will provide an accurate basis for assessing the accrued in-

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formation from the planned maintenance program, and its translation into profits.

In the adoption of a program of planned maintenance, consideration should be given to the following factors:

(1) Maintenance work to be done without interruption of operations.

(2) Maintenance work to be done during periods of voluntary idleness on equipment.

A detailed listing of the items to be considered in the first of these categories may appear time-consuming and elementary. It is usually surprising, and occasionally astounding to view the results of such procedure. The mere assemblage of information or maintenance methods will usually reveal possibilities for the integration and planning inherent in a planned system of maintenance. This statement is not made in the spirit of condemnation of maintenance methods which have been developed empirically, usually by subordinate plant personnel. In any proposed system of plant maintenance, much of the existing practice can be carried over into the maintenance schedule without change in procedure, but integrated to eliminate duplicate effort, and establishment of true labor requirements for regular maintenance work to be carried out without interruption to plant productivity.

METHOD

A more comprehensive discussion appears in order on a planned maintenance program to be carried out on units which have been withdrawn from the production line. A suggested approach for such an installation is outlined below:

(1) Adoption of a test and inspection schedule, either by unit processes, or by groups of inter-related equipment in a single continuous process, which will allow for a complete check-up on the physical condition of the equipment.

(2) Adoption of a rigorous, flexible, pre-planned inspection procedure, and an adequately planned system of repair to cover replacements normally anticipated, as well as a reasonable allowance for any unexpected findings revealed by the inspection.

(3) The installation of a system of records embracing field findings which will permit intelligent appraisal of future replacements and repairs; in short, a continuous history of the maintenance of each unit.

(4) The coordination of activities pertaining to maintenance under the supervision of responsible technical personnel, with proper liaison between maintenance and operating forces, and the sustained interest of management in this important phase of plant activities.

Naturally the application of these basic principles will be more or less detailed in accordance with the size and complexity of the processes involved. The selection of operating periods between test and inspection of the process equipment must of necessity be first based on past experience, and adjusted if necessary, in the light of subsequent data. The initial shutdown schedules can be worked out between operating and maintenance departments, and it is recommended that the management be represented in these conferences as well.

Although a detailed discussion of the procedure to be followed in a periodic test is beyond the scope of this article, it seems advisable to include two sketches illustrating the type of records which can be utilized for establishment of probable service life and replacement rates on equipment. Fig. 1 represents an isometric line diagram showing piping arrangements clearly, and designating the drilling points where caliper measurements of wall thickness are to be made. The equipment so indicated is fabricated of carbon steel, and operates under moderate pressure.

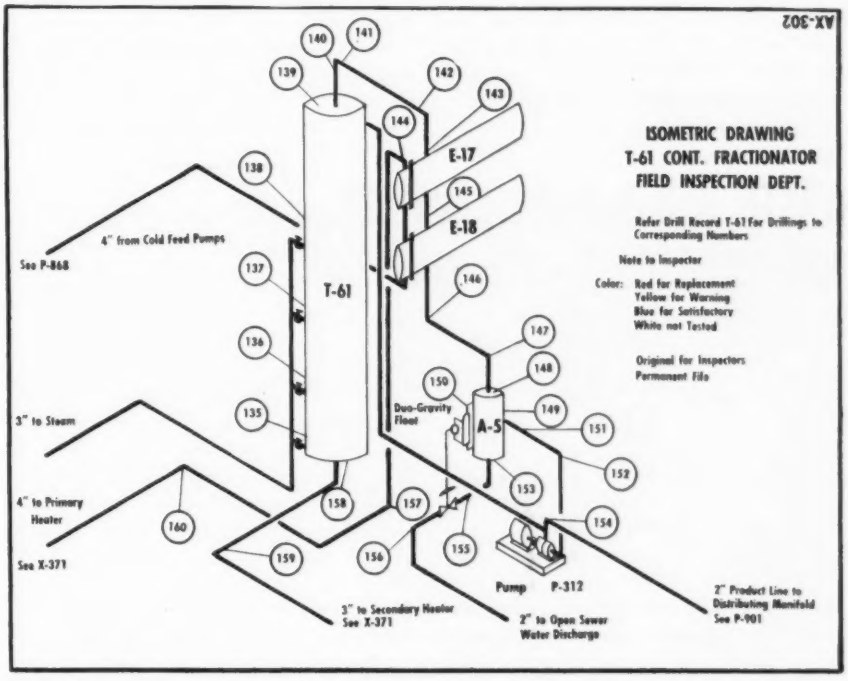


Fig. 1. Isometric line diagram, designating drilling points for caliper measurements of wall thickness.

FIELD INSPECTION DEPARTMENT

DRILLING RECORD T-61

Refer Isometric Drawing AX-302

Drilling Point	Orig. Thknss.	PERIODIC INSPECTION DATES 7/5/42	1/8/43	7/15/43	1/12/44	7/18/44	1/12/45		
135	1.125	1.110	1.092	1.068	1.046	1.046	1.040		
136	1.125	1.086	1.085	1.070	1.057	1.052	1.047		
137	1.125	1.090	1.072	1.071	1.058	1.046	1.043		
138	1.375	1.313	1.309	1.296	1.293	1.277	1.272		
139	0.49	0.45	0.45	0.40	0.41	0.39	0.33		
140	0.49	0.46	0.44	0.39	0.32	0.22 / 0.51	0.49		
141	0.49	0.45	0.44	0.37	0.36	0.32	0.24 / 0.48		
158	1.375	1.315	1.300	1.275	1.252	1.241	1.240		
159	0.49	0.47	0.41	0.40	0.38	0.33	0.19 / 0.51		
160	0.72	0.73	0.66	0.62	0.60	0.55	0.54		

Indicate Replacements Thus: Showing Both Old & New Calipering 0.27" / 0.51"

Fig. 2. Master tracing record used in conjunction with the drilling diagram to provide a permanent running record of the conditions at each test period.

The caliper points have been chosen to show regions where excessive metal loss may be expected from either erosion or corrosion. Fig. 2 shows a type of master tracing record used in conjunction with the drilling diagram to provide a permanent running record of the conditions found at each test period. A print of each of these diagrams is furnished to the plant inspector at each periodic shutdown for record of the conditions found, and the previously recorded information with respect to metal loss is available to maintenance personnel throughout the period of the test. The master tracing is retained in the office file and brought up to date after each inspection period. These will serve to illustrate the nature of records which can be maintained with relatively little effort to provide a suitable backlog of information for establishment of the frequency of maintenance shutdowns.

Obviously, the form of such reports will depend largely on the type of equipment present in the plant. The system evolved by the supervisory personnel engaged in the planning of maintenance at an oil refinery may be totally different from that installed in a plant for manufacture of pharmaceuticals. The important point is that a planned, systematic approach to the problem of maintenance is equally applicable, and that the same basic concepts govern the application of a program of planned maintenance in both plants.

One word of caution seems appropriate at this point. Cognizance should be taken of the relative age and efficiency of equipment subjected to a planned maintenance program. Even the most enthusiastic advocate of maintenance planning will hesitate to apply these principles to equipment approaching obsolescence, which has been or is ready to be retired by reason of total depreciation. In such cases, it may be highly desirable to operate such equipment to the point of incipient or actual failure, and to make repairs at such time on as modest a scale as temporary expediency may dictate. Such action is entirely justifiable in cases where dire need for production warrants operation of such obsolete equipment, and where the potential safety hazards due to equipment failure are minor or entirely non-existent.

WASTE WOOD BARK PROVIDES POWDERED CORK-TYPE MATERIALS

COMMERCIAL production and utilization of a range of products manufactured from hitherto waste tree bark has been announced by the Development Department of the Weyerhauser Timber Co. These various products (five in number at the present time) consist of mixtures of the three different constituents of wood bark. These three constituents differ greatly in their physical form and characteristics and consist of cork-like tissues in the form of flakes and hard tissues in two different forms, namely, an elongated form in the shape of stiff fibers and as soft friable tissues. During growth these three constituents are arranged in a rather specific pattern.

In the processing of trees for pulp or lumber it is first necessary to remove this protective layer, which is relatively thick in most species of commercial value in the Pacific Northwest. Work on use of this material required a two-point research program: first, a study of the means required for the economical separation of bark from wood in the processing of a log and second, a study of the commercial utilization of the bark thus produced.

Much of the early work was devoted to the production of cork to augment the decreasing supply of cork which was being received from the Mediterranean area. During the course of this work it was discovered that the other constituents of the bark, hard tissue and soft tissue, offered even greater promise as new industrial raw materials, having unique and useful properties. A pilot plant has been in operation, producing these materials for the past two years and commercial operation for the production of about a carload a day of five distinct bark products was scheduled for September 1.

The bark products are:

WT-383. A -28 mesh product with flakes of cork with thermoplastic properties comprising the principal constituent. This is pictured in Fig. 1.

WT-412. A -65 mesh product comprised of cork granules and hard spindle-shaped bast fibers. This mixture is pictured in Fig. 2.

WT-412F. A product consisting almost entirely of spindle-shaped bast fibers, 1/16" to 1/8" in length.

WT-472T. A -65 mesh product, 50% of which is -200 mesh consisting of a proportioned blend of cork, hard tissue and soft tissue, also thermoplastic in nature.

WT-490. A finely powdered material, 95% of which is -325 mesh, consisting of pure pulverized soft tissue which is a free flowing thermoplastic powder. This is pictured in Fig. 3.

These bark products are being successfully applied as conditioning agents in insecticide powders, ingredients for molding compounds and other plastics (Weyerhauser is now compounding this powder and a phenol-formaldehyde resin for the production of a molding powder on a pilot plant scale).

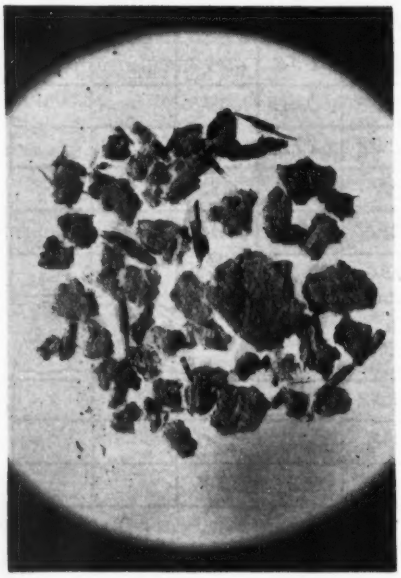


Fig. 1. WT-383, -28 mesh thermoplastic cork flakes (x15).

Fig. 2. WT-412, -65 mesh combination of hard tissue and cork granules (x15).

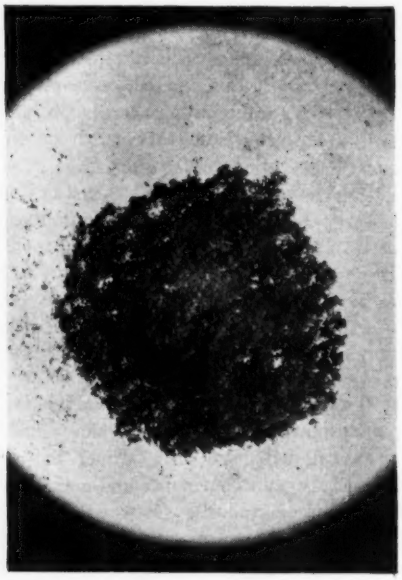


Fig. 3. WT-490, Pulverized soft tissue, 95% through -325 mesh (x15).

No. 9 of a series on
INFORMATION SOURCES FOR CHEMICAL MARKET RESEARCH

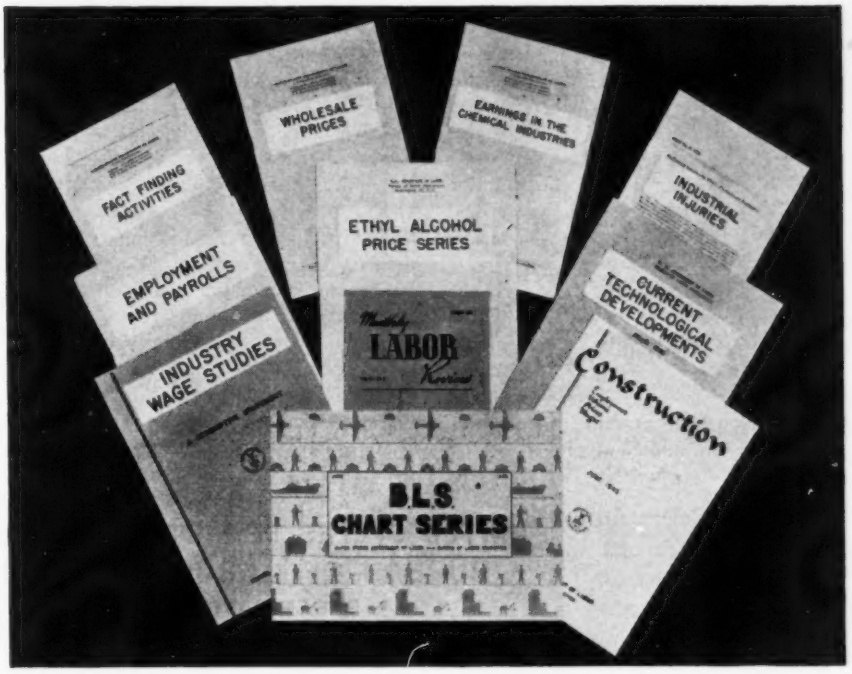
Services and Publications of THE U. S. BUREAU OF LABOR STATISTICS

by RICHARD M. LAWRENCE*
Development Department, Atlas Powder Company
Wilmington, Delaware

THE earlier articles of this series have dealt with data on a great variety of agricultural commodities, minerals and manufactured products In contrast, this article deals with the human interest statistics of wages and hours, employment and prices.

With a mandate from Congress in 1884 to gather and disseminate information on all matters affecting the welfare of workers, the Bureau of Labor Statistics has progressively broadened its work in a field of statistics and research that is vital to labor, industry and government. In its earlier days, the Bureau's major emphasis was on conditions of work and the explosive relations between capital and labor. As the American economy became more complex, with a resulting demand for more economic statistics for a wide variety of purposes, the Bureau developed its collection of statistics and now publishes a large part of all current data on employment, wages, prices, and working conditions.**

Outstanding among the early Commissioners of the Bureau were Carroll D. Wright, Charles P. Neill, and Ethlebert Stewart, who established its reputation as an expert but impartial investigator of the problems of labor. The Commissioners who guided its development to its major status as a statistical agency, when it became apparent that the welfare of workers was closely tied to the functioning of the economy as a whole, were Isador Lubin and A. Ford Hinrichs. Their successor is Commissioner Ewan Clague, a former official of the Social Security Board, who took office in July of this year.



A good many of the facts compiled by the Bureau are published regularly in booklet form.

The Bureau administers no laws and is essentially a fact-finding organization—for labor, industry, government, and the public generally. Its principal sources of information are employers and their cooperation is on an entirely voluntary basis —which constitutes an impressive vote of confidence in the Bureau's ability to compile, analyze, and interpret economic data bearing on highly controversial issues. By presenting facts bearing upon labor problems and thus eliminating questions of fact from the field of controversy, the Bureau paves the way for enlightened collective bargaining, Congressional policy decisions, and administrative action, whether by public agencies or by labor and management.

Labor statistics are of importance to industry not only because of their relevance to current economic developments and national economic policy but because of their usefulness as "management statistics." A large part of the Bureau's statistics are establishment data, reported by employers directly from their records, and in a form dictated by the common practices of business record keeping. To a considerable degree, therefore, the labor statistics collected and published by the Bureau of Labor Statistics are national, regional and local summaries of the statistics kept and analyzed by the individual firm, and thus provide a basis for comparison and analysis.

ORGANIZATION

The Bureau of Labor Statistics is one of nine agencies grouped in the Department of Labor. These agencies include the Conciliation Service, the Employment Service (U.S.E.S.), the National Wage Stabilization Board, the Apprentice-Training Service, the Women's Bureau, and others. The Commissioner of Labor

* The author acknowledges with gratitude the kind cooperation of Charles Stewart, Marion Hammett, Jesse Cutts and other staff members of the Bureau of Labor Statistics of the U. S. Dept. of Labor, who supplied material for this article.

** It should be noted that special segments of the labor picture are covered by other government agencies, such as the Department of Agriculture, Census Bureau, the U. S. E. S., Interstate Commerce Commission, Civil Service Commission, Railroad Retirement Board, Social Security Board, and a number of State bureaus. (For data on these publications, see: Special Libraries Association "A Source List of Selected Labor Statistics," 1944).

Statistics is the directing head of the Bureau and is responsible to the Secretary of Labor.

The Bureau is organized along lines of subject specialization into five major branches—Wage Analysis, Industrial Relations, Employment and Occupational Outlook, Prices and Cost of Living, and Working Conditions. Each Branch consists of a number of divisions (shown on the accompanying chart) specializing in specific subject fields. In all matters of statistical and research operations, the Branches and their Divisions are directly responsible to Aryness Joy Wickens, the Assistant Commissioner for Program Operations.

In each of the regional offices there is a Regional Director with a professional staff including wage, price, and employment analysts as well as clerical workers. Walter G. Keim is the Chief of the Field Service with responsibility for liaison between headquarters and the regional offices. A relatively recent innovation, the regional offices employ about one third of the Bureau's 1,700 regular employees but directly supervise all of the daily-rate agents who are hired as needed for the collection of price and other data and who may number several hundred at any one time.

Particularly in the past ten years, the Bureau has staked out quite plainly the main fields of its operations in the field of labor statistics and research. Because the scope of its interest is broad, the Bureau follows the practice of maintaining on a current and continuing basis the more important and indispensable statistical series on employment, wages, prices, strikes, productivity, and work injuries; and shifting its staff resources from time to time to meet the special demands that arise as new situations develop and new problems arise.

Under its new Commissioner, the Bureau is now making plans for expanded research activities in labor-management relations to the end of contributing toward better industrial relations; improved statistical services to labor and industry on basic economic data on wages, prices, and employment by stepping up speed of publication and by providing greater industrial and geographic detail; and for new techniques of statistical analysis of economic data that may be helpful in maintaining a stable level of employment opportunity.

PUBLICATIONS

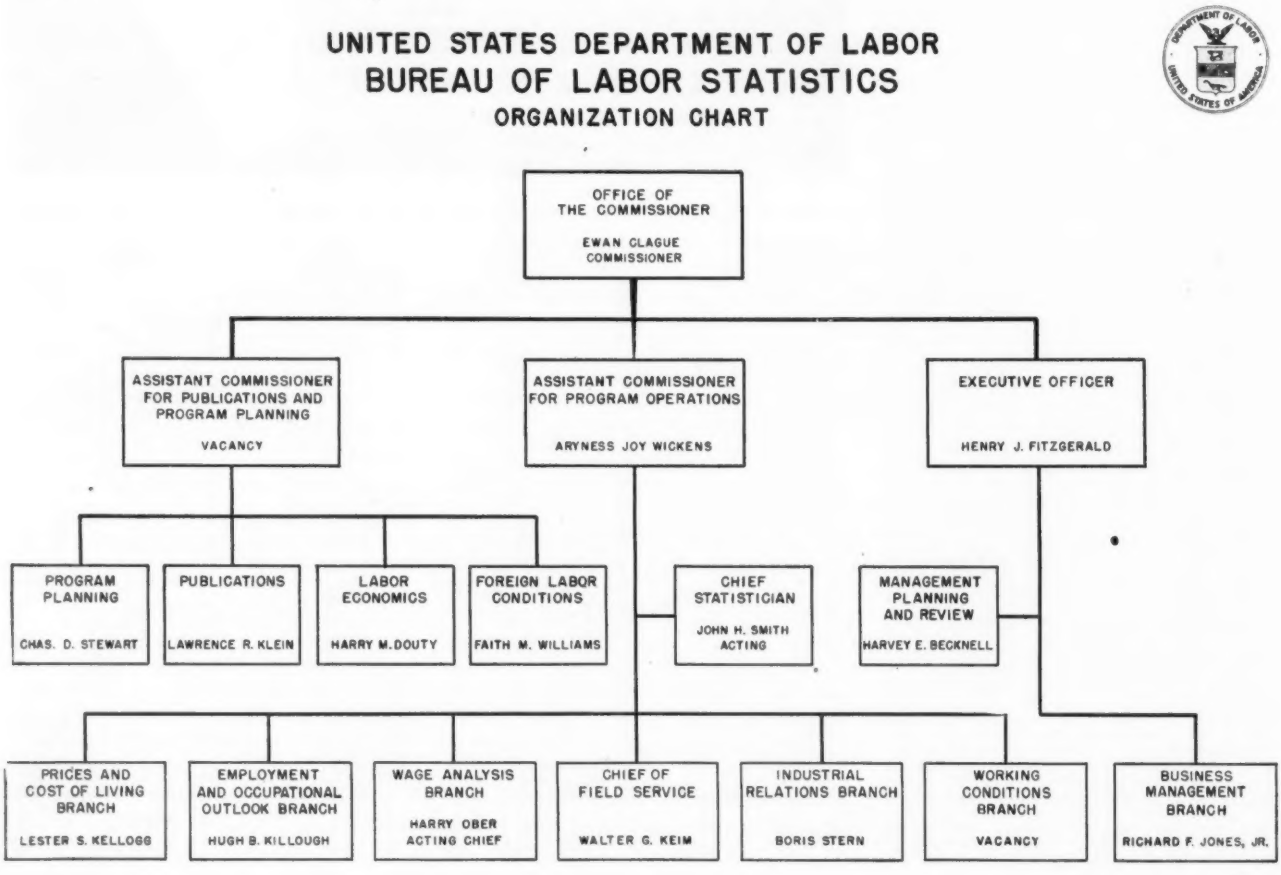
The Bureau of Labor Statistics publishes a wide variety of publications, ranging from the occasional Handbook of Labor Statistics and the Monthly Labor Review to topical bulletins and weekly and monthly mimeographed releases. The most convenient general summary of statistical materials is the Handbook of Labor Statistics, unfortunately not available since its 1941 publication, because of wartime paper restrictions, but soon to be resumed. In the meantime the Bureau has cooperated with the Bureau of the Census for more adequate presentation of labor statistics in that agency's Statistical Abstract of the United States, published annually.

The Handbook of Labor Statistics is a very comprehensive report, which ran to over 1400 pages in the 1941 edition. It presents, in convenient form, digests of hundreds of reports previously published by the Bureau and includes many statistical series covering a number of years.

The Monthly Labor Review has been the major publication of the Bureau of Labor Statistics for over 30 years. This monthly journal brings together a large part of the results of the Bureau's statistical and research work, and is the most convenient single source of information for all persons interested in intensive current coverage of labor developments and statistics. Much of the recurring statistical data is republished and readily available to subscribers to the Commerce Department's Survey of Current Business or the Federal Reserve Bulletin. The Monthly Labor Review is made particularly valuable by its semiannual indexes and its monthly bibliography of publications of interest to labor.

Bulletins or reprints are available for most of the analytical articles appearing in the Monthly Labor Review, the bulletins incorporating additional discussion and statistical material not published in the original Review articles because of space limitations.

For those with special interests in particular fields of the Bureau's activities, weekly and monthly mimeographed releases are mailed regularly upon request. These releases include the monthly sta-



tistics on employment, hours, and earnings, on labor turnover, on prices and cost of living, discussed in greater detail below.

The BLS Chart Series, published twice yearly and available free upon request, covers the major statistical series published by the Bureau. The monthly charts are drawn with extra space to permit users to post current data.

The variety of information available through the nine principal types of BLS publications is outlined below with special reference, for illustrative purposes, to statistical materials and studies of interest to the chemical process industries.

1. Employment

Industry and labor, the government and the public, are concerned with the trend of employment and the actual volume of employment in specific industries—nationally by State, and by area. Collection of employment statistics, expanded by the Bureau to meet the growing needs for such information resulting from the industrial growth of the Twenties, the depression of the Thirties, is now being further expanded as part of a program to meet needs of the reconversion and postwar period. Comprehensive and systematic employment series for detailed industry groups, both in manufacturing and non-manufacturing, were initiated in 1945-46 for each of the 48 States, and Congress has approved plans for extending this program to include important industrial areas.

Monthly totals of the numbers of employees in 7 broad industry groups—manufacturing, mining, trade, services, construction, government, transportation and public utilities—are supplemented by monthly data on pay rolls and number of production workers in 180 specific manufacturing and non-manufacturing industries. In the Chemicals and Allied Products group, e.g., employment estimates are published for 12 sub-groups including paints, drugs, rayon, and explosives. In addition, Rubber products are divided into three industry headings and Petroleum and Coal products into four industry groups.

The employment statistics are available in mimeographed releases prior to publication in the *Monthly Labor Review* and can be obtained by request (Employment and Payroll Report). Data by States can be obtained by request to the regional offices or to the Commissioner of Labor Statistics.

2. Labor Turnover

Employers in 90 manufacturing industries and selected non-manufacturing industries report monthly to the Bureau on separation and accession rates—quits, layoffs, discharges, and new hires. The national summaries published by the Bureau give employers a useful statistical tool to compare their own plant record with industry-wide experience, to see whether their labor turnover is excessive. It is also useful in general analysis of the changing character of the labor market. The data are classified not only by industry, but by sex and veterans' status by industry to show how turnover of veterans and women compare with workers generally.

For the Chemicals and related industries, details are published for nine specific industry groups, including most groups for which employment data are published. The data are published regularly in the *Monthly Labor Review* following release in mimeographed form (Labor Turnover Release).

3. Wages and Hours

Because wages represent income to workers and costs to employers, reliable information on changes in wage rates and earnings are of paramount interest to labor and industry. In the absence of reliable information, both collective bargaining and public-policy determination would bog down over disputes over conflicting facts. The Bureau's reports in this field are of two general types:

(a) Monthly series based upon employers' employment and payroll reports in 140 manufacturing and selected nonmanufacturing industries covering total payrolls, average hourly earnings, average weekly hours of work, and average weekly earnings. Available by request (Hours and Earnings Report).

(b) Periodic industry wage studies providing wage rates for key occupations in leading industries, nationally, by region, and for large cities. The industry wage studies also provide data on shift differentials, vacations, lunch and rest periods, insurance, and incentive methods of pay.

In addition, annual surveys are made of union wage scales in selected industries, and urban wage rate indexes are published showing wage rate trends obtained by

Left, Lester S. Kellogg, chief, Prices and Cost of Living Branch; right, Harry Ober, acting chief, Wage Analysis Branch.

Left, Boris Stern, chief, Industrial Relations; right, Hugh B. Killough, chief, Employment and Occupational Outlook Branch.

Charles D. Stewart, chief, Program Planning Staff.

field visits to representative firms in 69 areas, for the purpose of showing general changes in the interim between industry wage studies.

Under the project carried on to assist the National War Labor Board in the administration of the Government's Wage Stabilization Program, a considerable number of local surveys were made in 1943 and 1944 in various branches of the chemical industry. Some of the more important branches covered are cottonseed oil, paints and varnishes, soap, drugs and medicines, industrial chemicals, and fertilizers. The results of these studies are available in some instances in mimeographed form and in others through special tabulations available upon request.

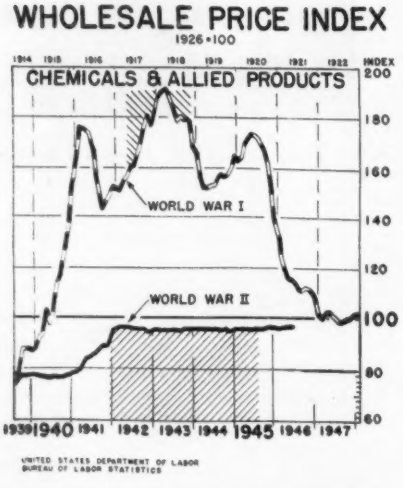
In 1944, the Bureau made a survey in establishments engaged in the manufacture of rayon filaments and rayon staple fibre from cellulose or cellulose base. During the year, a survey was also made in the explosives industry. The results of the former study appear in the December 1944 Review as well as in Bulletin 806, and the latter in the March 1945 *Review* and Bulletin 819.

Studies of occupational earnings were made early in 1946 covering industrial chemicals, such as tanning materials; primary coal tar products; bone black, carbon black, and lamp black; and other industrial chemicals not elsewhere classified. The results of these studies on a local basis (large cities only) are now becoming available for distribution. In most instances, however, tabulations are not available, on a product basis, but rather for *industrial chemicals as a whole.*

The Bureau's 1946 program of Industry Wage Studies calls for occupational wage surveys during the July quarter in establishments manufacturing paints, varnishes and lacquers; drugs and medicines; perfumes, cosmetics and other toilet preparations; and soap and glycerin.

4. Prices and Cost of Living

Prices are key economic data, and in the present period quite obviously so to the general public as well as to business men and economists. Collection and publication of price series have been a major function of the Bureau since the Eighties, since which time the agency has been recognized as the Federal agency with primary responsibility in this field. The scope of the Bureau's price series has included, for half a century, data on wholesale prices, retail prices, and consumer (or cost of living) prices.



Wholesale price indexes are maintained on a continuous and current basis by the BLS.

The Bureau's work in the price field is broader than simply computation of price indexes. The Bureau is continuously engaged in evaluation of price developments and policy. Its publications include, for example, the only official history of wartime price control. For technical purposes, the Bureau is continuously engaged in work on commodity specifications and on consumer expenditures, for the purpose of statistical precision, adequate weights, and check upon prices actually paid.

Briefly, the Bureau currently publishes:

(a) The Consumers' price index for moderate-income families in large cities, the official index showing monthly changes in costs for a selected group of commodities and services, nationally and for selected cities.

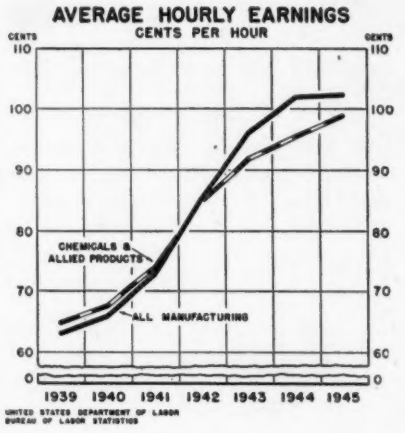
(b) Retail indexes for 78 food items in 56 large cities; indexes for clothing, housefurnishings, miscellaneous goods and services in selected cities; retail fuel prices in 55 cities; rents semi-annually from 45,000 tenants in 39 cities; and intercity differences annually in the costs of equivalent food, clothing, fuel, housefurnishings, services and housing in 31 cities.

(c) Wholesale price indexes, weekly and monthly, covering 900 commodities in 10 groups and 49 subgroups; daily prices of 28 basic raw materials sold on organized commodity markets; wholesale prices of construction machinery and general and auxiliary machinery, quarterly; and prices of machine tools, semi-annually; prices of waste and scrap material, quarterly.

(d) Prices of 42 building materials, dealer to contractor, quarterly for the nation and semi-annually in 53 cities.

Publications of special interest to the chemical industry include the quarterly and annual narrative reports in the *Monthly Labor Review* on price developments, particularly the section on Chemicals and Allied products; the mimeographed releases on Chemical and Allied product indexes, annually since 1926, monthly since 1933, and Chemicals and Drugs, monthly, 1890 to 1926; the monthly report, *Construction,* which provides indexes of building materials prices (including paints and selected chemical products) nationally and by city. Actually over 60 chemical and related products are priced by the Bureau, and indexes are published for 138 commodities or groups in the chemical field, 29 in the paint group, as well as others in closely related fields.

Specifications of Wholesale Prices, Part 8, available upon request, lists the specifications used by the Bureau in its price



work in Chemicals and Allied Products. Similar technical publications are also available for other major commodity groups, as also are publications describing the construction and weighting of the indexes.

5. Industrial Hazards

The prevention of industrial accidents is a common objective of labor, management, and government. In accident prevention work there is growing realization of the importance of creating statistical tools that will reveal where the danger spots are to which safety measures can be directed. The Bureau publishes annual and monthly data on accidents and industrial injury-frequency rates, by industry and by cause, which are widely used by State and Federal agencies concerned with accident prevention and by safety engineers of insurance companies and industrial establishments.

Industrial injury-frequency rates are published for 10 Chemical industries in the quarterly reports appearing in the *Monthly Labor Review.* Included are explosives (with virtually the lowest frequency rate of any industry), industrial chemicals, drugs and insecticides, compressed and liquefied gases, paints, soap, synthetic rubber, synthetic fibers, and other chemical products.

Accident cause surveys are conducted in several industries each year to point up working conditions and work practices which give rise to preventable work injuries. Studies are also made to indicate the effect of physical working conditions on efficiency, output, absenteeism, as well as accidents.

6. Industrial Relations

The ebb and flow of industrial disputes is depicted by the Bureau's official monthly statistics on the number of labor-management disputes, workers involved, and man-days of time lost. The statistics are analyzed to show causes, industries affected, States and cities, unions involved, methods of settlement, and results. More useful for practical purposes—for collective bargaining negotiations, for plant industrial relations—are the studies of the provisions of collective bargaining agreements on file with the Bureau and the studies of day-by-day working relations

from the point of view of improved industrial relations and techniques.

Bulletin 716 deals with Collective Bargaining in the Chemicals Industry (1942), and Bulletin 865 on the Extent of Collective Bargaining and Union Recognition, 1945, includes reference to the chemical industry.

7. Productivity and Technological Developments

One of the most dynamic factors in economic life, technological changes can affect the whole industrial structure, the input-output relations between industries cost-price relationships, and the job content of occupations. The Bureau issues monthly a "Summary of Current Technological Developments," digesting developments reported in 200 trade, technical, and scientific publications.

For several years the Bureau has been developing a new technique for analysis of the interrelationships between industries in terms of output, expenditures, and employment. Based upon a statistical investigation of normal relationships between the various industries of the American economy, the end-product of the research (which may be called an input-output chart) shows in quantitative terms how the demand for goods in one industry affects output and employment in all other industries. For example, this statistical apparatus is designed to show the increased demands for paper products or chemical products by the various industries in the economy if total consumer expenditures increase by, say, 10 per cent.

Indexes of productivity for manufacturing and non-manufacturing industries have been published by the Bureau for many years. Currently, annual productivity and unit costs indexes are published for 29 manufacturing and for selected non-manufacturing industries. ("Productivity and Unit Labor Costs in Selected Industries.") The manufacturing industries include among others, fertilizers, paints and varnishes, petroleum refining, cement, coke, glass products, paper and pulp, and rayon and allied products. These indexes are comparable to those shown in an earlier report, "Productivity and Unit Labor Cost in Selected Manufacturing Industries: 1919-1942," covering a larger number of industries. Summary indexes for chemicals from 1929 to 1940 are shown in an article on "Productivity and Technological Changes in the Chemicals Industry, 1929-1940," in the *Monthly Labor Review*, July 1942.

The Bureau is now undertaking a new approach to direct reporting by employers of labor requirements for selected products in industries with such diverse products that total output cannot be compared with total hours worked, as in the standard approach to productivity measurement.

8. Occupational Outlook Studies

Industry has shown a great deal of interest in the Bureau's new work in the field of occupational outlook research. The studies are intended as materials for persons and agencies concerned with vocational guidance, and stress the long-range prospects for employment in occupations and major industries of the United States. Studies published to date include the commercial air transportation occupations, automotive and Diesel-engine mechanics, foundry occupations, physicians, welders, etc. Forthcoming shortly is a study on the employment outlook for chemists and chemical engineers.

Closely related are occasional studies on the economic status of various professions and occupations, such as "Factors Affecting Earnings in Chemistry and Chemical Engineering," in the June, 1946, issue of the *Monthly Labor Review*. (cf. Chem. & Eng. News, **24**, 1649 (1946).)

9. Construction and Housing

As indicated above, the Bureau's program is organized on the basis of subject-matter fields and thus cuts across industry lines. Because of the current importance of the construction industry, the Bureau sums up all of its materials on employment, construction volume, prices, wages, and rents as related to the housing program and the construction industry in a monthly mimeographed publication, "Construction," available upon request.

Headquarters of the U. S. Dept. of Labor at Constitution Ave. and 14th St., Washington.

SPECIAL INFORMATION

The major purpose of this series of articles is to present a key to the thousands of valuable publications available to the market researcher. The minor theme, oft repeated, is that, much *un*published information is also available on request.

In its report "Fact-Finding Activities of the Bureau of Labor Statistics," Bulletin No. 831 (May 1945), spokesmen for the Bureau observe that it is impossible to publish all of the large volume of information which is assembled and analyzed. Much of it has been compiled for unique and specialized policy problems and is not of sufficiently broad interest to warrant publication for general use. Frequently, however, these unpublished materials would be of great use to labor groups, individual employers and associations if they were aware that such information is available. The above mentioned Bulletin indicates the fields in which data are likely to be accessible.

Through correspondence or consultation, the Bureau is glad to comply with requests for information on subjects in the broad field of labor economics. Visitors are also welcomed to its big and specialized library in Washington.

Requests may be sent to the Commissioner of Labor Statistics in Washington or to the Bureau's regional offices in Boston, New York, Philadelphia, Atlanta, Cleveland, Detroit, Chicago, Kansas City, Dallas, Denver, San Francisco and Seattle. The field offices are equipped with voluminous files of BLS reports and are prepared to offer expert advice on the analysis and interpretation of these materials. (BLS reports are also available at depository libraries of which there are several in most states.)

SELECTED CHECK LIST OF PUBLICATIONS
U. S. Bureau of Labor Statistics

Copies of the *Monthly Labor Review*, and of Bulletins, can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at the prices stated. Payment should accompany order (postage stamps not acceptable).

Limited requests for other releases will be filled without charge, while the supply lasts, by the Bureau of Labor Statistics, U. S. Department of Labor, Washington 25, D. C.

(a—*annual*, s-a—*semiannual*, m—*monthly*)

Catalogues, bibliographies

Selected List of Publications of the Bureau of Labor Statistics. (1941) Bull. 683. 10¢

Selected List of Publications of the Bureau of Labor Statistics: 1943 Supplement. (1943) Bull. 747. 10¢

Publications of the Department of Labor (Jan. 1, 1946)

Labor: Child Labor, Women Workers, Employment, Wages, Workmen's Insurance, and Compensation. Price list 33, Gov't Printing Office. (May 1946. Obtainable without charge from Gov't Printing Office.)

Periodical Publications, Printed

Monthly Labor Review (m) 30¢ per copy, $3.50 per year. The organ of the Bureau.

BLS Chart Series (s-a) Charts on all Bureau statistical series.

Handbook of Labor Statistics, 1941 edition. Bull. 694.

Vol. I. All topics except wages. $1.00

Vol. II. Wages and wage regulation. 45¢

Industrial Relations Handbook, 1945-46. First

number: will become available about Dec. 1946. Price to be announced.

Bulletins

682. Employment and Earnings in the Engineering Profession, 1929 to 1934. (1941) 25¢
716. Collective Bargaining in the Chemical Industry. (1942) 5¢
737. Wages in Rubber Manufacturing Industry, August 1942. (Reprinted from *Monthly Labor Review*, Feb. and March 1943) 10¢
749. Wartime Prices
Part I. August 1939 to Pearl Harbor (1944) 35¢
Part II. Pearl Harbor to D-Day. (In press)
751. Hours and Earnings in the Fertilizer Industry, January 1943. (1943) 5¢
806. Wages in the Rayon Industry, May 1944. (1945) 10¢
810. Wages in Petroleum Drilling and Production in the Southwest, April 1944. (1945) 5¢
819. Average Hourly Earnings in the Explosives Industry, June 1944. (1945) 10¢
823. Union Agreements in the Petroleum-Refining Industry in Effect in 1944 (1945) 10¢
831. Fact-Finding Activities of the Bureau of Labor Statistics. (1945) 10¢
849. Work Injuries in the United States During 1944. (1945) 10¢
860. Trends in Urban Wage Rates, April-October 1945. (1946) 5¢ (Period Oct. 1945-April 1946 will be covered in a forthcoming bulletin.)
865. Extent of Collective Bargaining and Union Recognition, 1945. (1946) 5¢

Reprints of Articles in Monthly Labor Review
Date is that of publication in the Monthly Labor Review

R.1142 Unit Labor Costs in 20 Manufacturing Industries, 1919 to 1939. (July 1940)
R.1252 Earnings and Hours in the Drug, Medicine and Toilet Preparations Industry. (April 1941)
R.1357 Earnings and Hours in the Rayon and Silk Industry, 1940. (August 1941)
R.1380 Professional-personnel Requirements of Industrial-research Laboratories. (October 1941)
R.1534 Wages in Southern Cane-sugar Refineries, Winter of 1942-43. (May 1943)
R.1536 Labor Requirements for the Synthetic Rubber Industry. (May 1943)
R.1558 Employment of Women in Petroleum Industries. (August 1943)
R.1639 Chemical Poisoning in Shipyards. (April 1944)
R.1725 Wage Rates in the Manufacture of Molded Plastic Products in Chicago, July 1944. (January 1945)
R.1748 Labor Requirements for Manufacture of Synthetic Rubber. (May 1945)
R.1833 United Rubber Workers of America. (April 1946)
R.1834 1945 Convention of Oil Workers International Union. (April 1946)
R.1835 Wage Policy and the Role of Fact-finding Boards. (April 1946)

Articles in Monthly Labor Review

Productivity and Technological Changes in the Chemicals Industry. (July 1942)
Factors Affecting Earnings in Chemistry and Chemical Engineering. (June 1946)

Periodical Publications, Mimeographed

Employment and Payrolls (m). Data by industry.
Hours and Earnings (m). Data by industry.
Labor Turnover (m). Data by industry.
Average Wholesale Prices and Index Numbers of Individual Commodities (m). Published in permanent form, 1913 to date, in semiannual pamphlets and in annual bulletins. Year 1943, in Bulletin 785 (10¢). Years 1944 and 1945 in bulletins now in press.
Construction (m). Includes data on paints and paint materials.
Summary of Current Technological Developments (m).

Prices: Special Tabulations and Other Releases

Specifications for Wholesale Commodity Prices, Part VIII, Chemicals and Drugs (Mimeo., Sept. 1939). Contains specifications for chemicals, drugs and allied products priced for inclusion in recurring index numbers and as supplementary data. In addition, prices for over 300 other chemicals, drugs and allied products are regularly compiled.
Specifications for Wholesale Commodity Prices, Part VI, Building Materials (Mimeo., Sept. 1939). Contains specifications for paints and paint materials priced for inclusion in comprehensive wholesale price index numbers and supplementary use.
Index Numbers of Wholesale Prices by Groups of Commodities. (Mimeo., Tabulation No. 4924). Shows index numbers of wholesale prices by groups of commodities, including chemicals and drugs, from January 1890 through December 1912.
Index Numbers of Wholesale Prices by Groups of Commodities (Mimeo. Tabulation No. 14235). Shows index numbers of wholesale prices by groups of commodities, including chemicals and allied products, by years and months from January 1913 to date.
Index Numbers of Wholesale Prices by Groups and Subgroups of Commodities (Mimeo. Tabulation No. 3052 and 9262). Shows index numbers of wholesale prices for chemicals and allied products and component subgroups by years and months from January 1913 to date.
Index Numbers of Wholesale Prices by Groups and Subgroups of Commodities (Mimeo. Tabulation No. 3051). Shows index numbers of wholesale prices for the building materials group and component subgroups including paint and paint materials by years and months from January 1913 to date.
Weekly Index Numbers of Wholesale Prices by Groups of Commodities (Mimeo. Tabulation No. 5975). Shows index numbers of wholesale prices by groups of commodities including chemicals and allied products by weeks from January 1932 to date.
Index Numbers of Wholesale Prices for Specified Groups of Commodities (Mimeo. Tabulation No. 5812). Shows index numbers of wholesale prices for special groups of commodities by stages of precessing, such as raw materials, manufactured products, etc., and including products of the chemicals and allied industries, by years and months from January 1913 to date.
Revised Ethyl Alcohol Price Series and Index Numbers for Drugs and Pharmaceuticals and Chemicals and Allied Products (Mimeo. Report No. LS 45-2817). Contains description of the revised ethyl alcohol price series and gives revised index numbers for drugs and pharmaceuticals and chemicals and allied products from October 1941 through December 1944.
Market Structure and Gross Margins of Unmixed Nitrogen Fertilizer Materials, 1940-41 Season (Mimeo. Report No. LS 43-5308). Describes the market structure and gives gross margin data for nitrogenous fertilizer materials during the 1940-41 season.
Price Structure of Trisodium Phosphate and Tetrasodium Pyrophosphate (Mimeo., Feb. 4, 1942). Describes price structure of certain phosphate materials.
Paint and Varnish, Conservation of Fnished Product and Control of Raw Materials 1917-1918 (Mimeo. No. LS 42-776). Describes government activities relating to paint and varnish during the early part of First World War.

Other Mimeographed Releases

Chemicals, Charleston, West Virginia, July 1943. Wage structure of the industry.
Industrial Chemicals in Detroit, Michigan, Oct. 1943. Wage structure of the industry.
Wage Structure in Industrial Chemicals (forthcoming).
Wage Structure in Pulp Mills, Paper Mills and Paper Products (forthcoming).
History and Disposition of a Powder Plant Project: Nitro, West Virginia, 1917-1942 Historical Study No. 78).
Productivity and Unit Labor Cost in Selected Manufacturing Industries, 1919-1940. (Feb. 1942). Includes fertilizer, paint and varnish and other industries.
Productivity and Unit Labor Cost in Selected Manufacturing Industries, 1939-1945. (May 1946) Supplement to the earlier publication.

Exporter's Primer

Do's and Dont's for U. S. manufacturers interested in entering and competing successfully in the fertile Latin American market.

DONT'S

1. Don't fail to learn Spanish *and* Portugese.

2. Don't hire an interpreter unless absolutely necessary. If you must, make sure he knows the technicalities of your business and product.

3. Don't tie in with an export agent who handles too many lines, or whose lines differ widely from yours.

4. Don't be impressed with an export agent just because he has many offices throughout Latin America. Many offices mean many lines—but not necessarily a good selling job for *you*.

5. Don't give representation of your line to a Latin American citizen you haven't investigated. He may need business because he's disliked by his compatriots. In any event, his political background should also be investigated, particularly if the city, state or federal governments are your potential customers.

6. Don't go to Latin America yourself unless you like the people and the places or think you will like them. Latinos are sensitive to American "hurry-up" because of a desire to get back home.

7. Don't hire a European to push your North American product.

8. Don't fail to educate your customers in the correct use of your product. The manufacturer is blamed for poor results when a product is used for purposes for which it was never intended.

9. Don't permit Latino importers to sell your product at inflationary prices. This can cause permanent damage to the goodwill you need.

DO'S

1. Do set up your own export department and hire an experienced technician; send him to Latin America to become acquainted with present prospects and find new ones.

2. Do pay such a man well and guarantee his expenses. Investigate him thoroughly first and then place complete trust in him.

3. Do work through an American export house when your product fits in well with those already carried by the firm, and so take advantage of a tested prospect list.

4. Do investigate your export-agent candidate thoroughly. Many of those set up in American port cities ruthlessly exploit both Latin American buyers and U. S. manufacturers.

5. Do consider forming an export organization with other non-competitive manufacturers if you cannot afford a full fledged department of your own. Your firm will then sell to the export company which charges a small commission to pay expenses. Representatives are trained to handle the business of all, and each member firm takes an equal part in the management.

6. Do grant exclusive export representation to another manufacturer who already maintains an active export organization for products which complement yours.

7. Do give thought to credit extension. Europeans are said to be much more generous in this respect than we are.

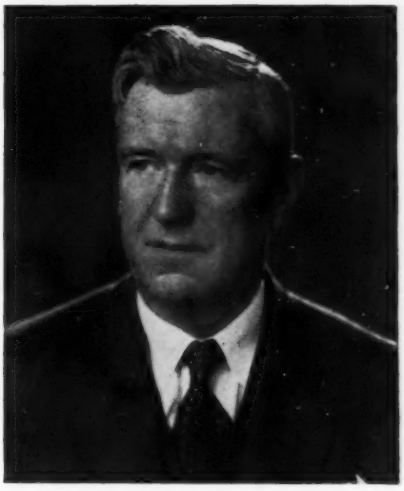
8. Do consider the rising standard of living in Latin American countries and what an infant export business will mean to you in the long run.

9. Do keep the friendship and respect of Latinos with whom you do business. This is good public relations—and we need more of it in Latin America.

Condensed from "Exporter's Primer" by David Lindquist, *Inter-American* magazine, July, 1946.

HEADLINERS in the NEWS

F. M. DINKINS, associated with American Cyanamid Co., Inc., since 1923, has been named president of Jefferson Chemical Co., owned by American Cyanamid and Texas Co.

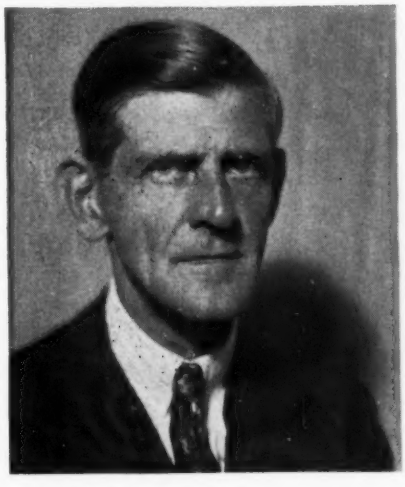


W. F. LEICESTER, elected vice-president of the Borden Co. Affiliated with the adhesives industry since 1920, he also is president of the subsidiary Casein Co. of America.

FRANK HAMILTON, elected vice-president of Nicaro Nickel Co., subsidiary of Freeport Sulphur Co. Previously with WPB, he joined Freeport in 1943, as assistant to the president.

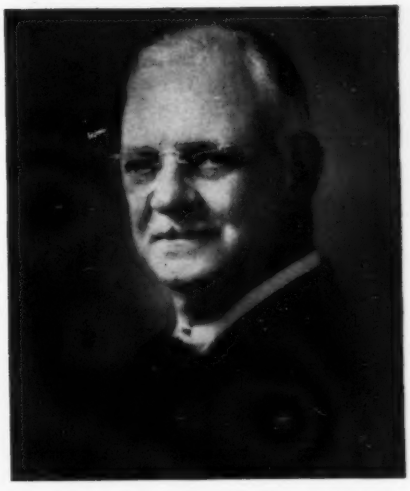
ROGER ADAMS, head of the department of chemistry, University of Illinois, awarded the Priestley Medal by the ACS. He received the medal at the Chicago Convention, Sept. 11.

HAYDEN B. KLINE, elected executive vice-president, Industrial Rayon Corporation. Mr. Kline joined the company as a research chemist 1925 and has been a director since 1933.

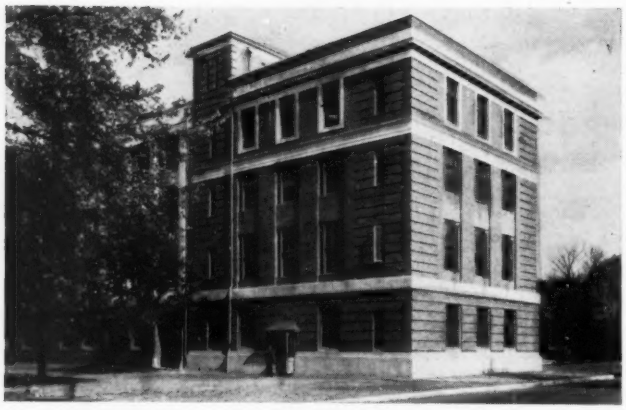


H. JERMAIN CREIGHTON, awarded the Acheson Medal by Electrochemical Society in recognition of his accomplishments. Presentation will be made at Toronto in October.

P. C. WHITE, named chief chemist of the Whiting laboratories of Standard Oil Co. (Indiana). Dr. White, who joined Standard eight years ago, succeeds F. M. Rogers, retired.



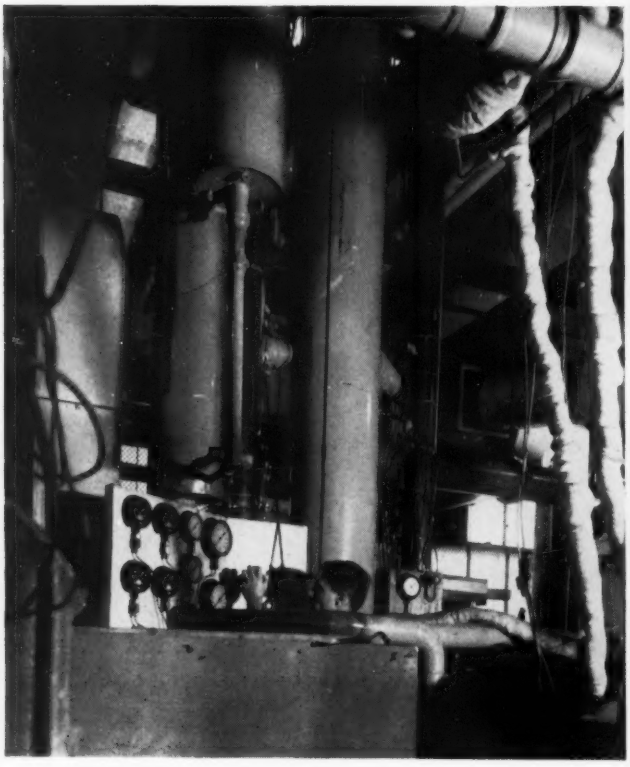
VAL KOLB, elected divisional vice-president, Winthrop Chemical Co., Inc. Formerly president, Provident Chemical Works, he will direct marketing of vitamins.



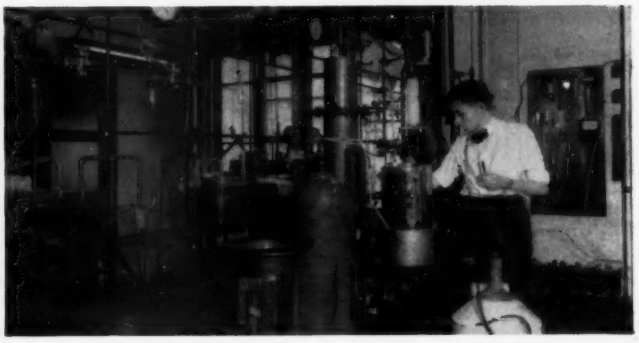
New Cryogenic Laboratory...

In 1925 there were only two laboratories in the U. S. equipped to carry on a broad range of low-temperature research. Today, there are fourteen, and among the most modern of these is the Cryogenic Laboratory at Ohio State University. During the war its facilities played an important role in Manhattan Project developments, and its activities were "top secret". Now, a few details have been released, and research on a number of other fronts is in progress.

Among the topics on the research agenda are: accumulation of basic data on chemical thermodynamics; thermodynamics of high pressure gases; superconductivity; nuclear moments; and the physical and engineering properties of metals.



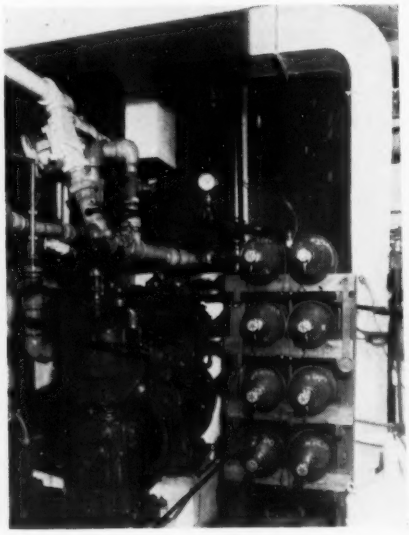
Air rectifying unit, with nitrogen column in right foreground, and heat exchangers at left. The gauge board and copper tubing on post are for withdrowing liquid and vapor samples from selected plates.



Research equipment, including a typical vacuum bench with a portion of glass high vacuum lines in lower left foreground. Three types of cryostats, used at liquid air temperatures, are in center foreground.

G. A. Wright, draws liquid air from liquefying apparatus, at 308 degrees Fahrenheit below zero, while H. L. Johnston looks on. Ohio State is also installing extensive helium liquefying equipment.

All thermocouple and resistance thermometer leads can be routed through this switch panel. It controls temperatures throughout laboratory.



Two of the four vacuum pumps at the laboratory are shown at left. A portion of the high pressure storage system is pictured at right.

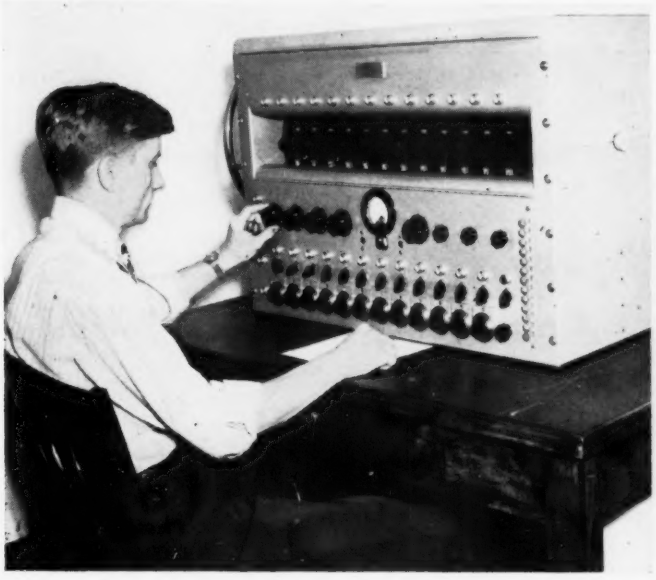
Liquid hydrogen (—418 F.) is produced in this unit, for atomic research work. Electrolytic cells supply the gaseous hydrogen.

...and a New Physics Laboratory

The growing importance of catalysis, as a factor in the progress of the oil refining industry, has led to a greater appreciation of the possibility of applying physical methods to the solution of largely chemical problems. And, to further such research, Universal Oil Products Co. opened a new $250,000 Physics Laboratory at Chicago recently.
Major objective of the division will be to expand the knowledge of existing catalysts, to increase the efficiency of known catalysts, and to develop new types. In addition, work will be conducted on the identification and quantitative analysis of gaseous and liquid hydrocarbons, and derivatives, as well as on general physico-chemical studies of interest to petroleum refiners.

Construction of the building itself presented many engineering problems for extensive air conditioning and anti-vibration measures had to be taken to assure accuracy in the operation of extremely sensitive apparatus. All incoming air is filtered, humidified, warmed (or cooled) and scientific equipment is supported on concrete-based pipe columns free from contact with the walls and insulated from the floor by cork expansion joints.

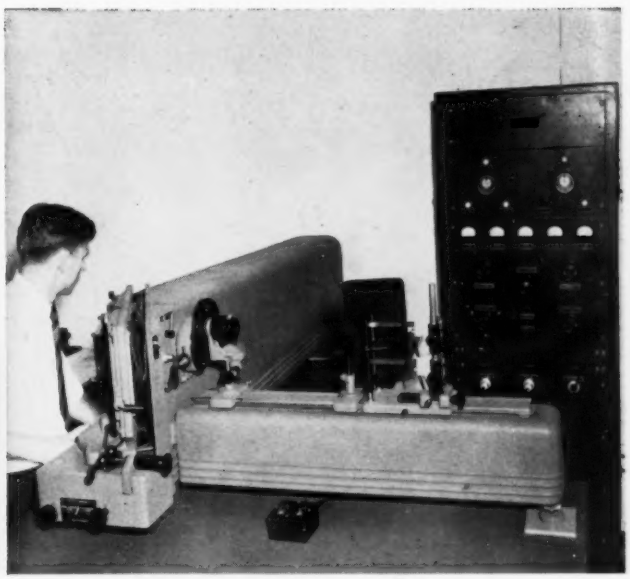
One section of the recently-constructed physics laboratory, Universal Oil Products Co., Chicago. It is an outgrowth of plans laid in 1939 and was largely designed by the physicists who will work therein.



An auxiliary instrument, used in conjunction with the mass spectrometer, is the electrical computer. It speeds the solution of linear simultaneous equations obtained in the analysis of hydrocarbons.

By means of the infrared spectrometer pictured above, normally difficult, or time-consuming quantitative and qualitative analyses can be completed rapidly. Major use is in isomerization products.

Among the most useful equipment is the recording photometer. In addition laboratory installations include, X-ray and electron diffraction units, an electron microscope, and Raman spectroscope.



A quartz emission spectrograph rounds out spectrographic facilities at UOP. Ultraviolet spectroscopy is of particular value in controlling the operation of hydroforming units for maximum toluene output.

Begin Large-Scale Streptomycin Production

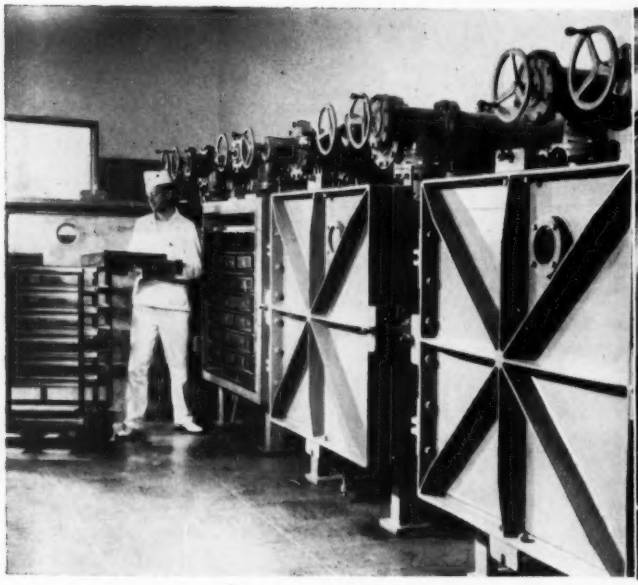
Under construction since last August, Merck & Co., Inc., recently brought into operation one of the world's first units for the commercial production of streptomycin, at Elkton, Va. Although full output is not expected to be realized at the $3.5 million project until the end of this year, the quantity of the life-saving drug which is shipped from Elkton will contribute to a broadening of streptomycin distribution under the CPA depot hospital program. Hitherto, total supplies of the antibiotic in the U. S. have been obtained from pilot plant operations of Merck and several other private concerns.

At the Elkton plant (upper right)—which is a three building project, having 50,000 square feet of floor space—production of the "wonder drug" is started from test-tube cultures of the organism Streptomyces griseus. Through special processes these organisms are put through repeated stages of growth to yield streptomycin in the 15,000 gallon fermenter tank. The resultant broth is filtered to separate the organism from the liquid, and the drug solution is concentrated and purified.

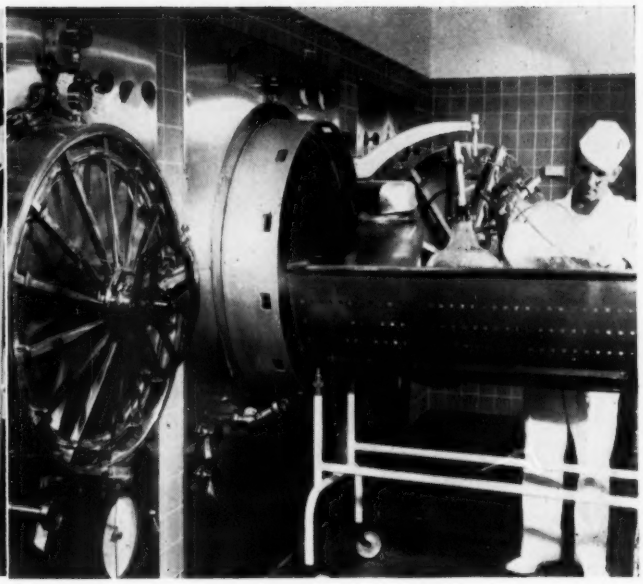
This semi-finished material is shipped in specially designed refrigerated containers to Merck's Rahway, N. J. facilities for finishing and packaging. There it is handled in air-conditioned, sealed rooms, with dust-free, ultra-violet ray treated air. To avoid contamination from air-borne microbes, the entire manufacturing process must be carried out under rigidly controlled sterile conditions.

The final finishing step (right) is accurate weighing of small quantities of the powdered streptomycin. This is done on delicate analytical balances, in hermetically sealed cubicles, and the drug is placed into small, one-gram vials, sealed with a rubber stopper and an aluminum cap.

While the short supply has limited clinical research, streptomycin has been found to be highly effective against several types of diseases which resist penicillin and sulfa drugs. Among the more promising are: influenzal meningitis, tularemia ("rabbit fever"), and certain urinary tract infections and blood poisoning. It may also have some value in the treatment of certain types of tuberculosis—but clinical tests are not as yet conclusive.



Unloading dried streptomycin from freeze-dry cabinets at the Rahway, N. J. plant. Basis of the operation is the drug-containing broth received in stainless steel, refrigerated flasks from the fermenter.



Complete sterilization of every piece of equipment used in the final purification of streptomycin is a "must". Shown here are containers and filtrate flasks entering the sterilizer to destroy foreign organisms.

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2. **A camphor substitute in cellulose nitrate compositions**
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4. **A plasticizer in lacquer coatings to improve water, acid and alkali resistance**
5. **A stabilizer with some plasticizing action in varnishes**

Other uses may suggest themselves when you study the table of physical and chemical properties included here . . . Samples and technical information will be sent promptly on request. Contact the nearest Monsanto District Office, or write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

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(From Typical Analyses)

Molecular Weight	199.20
Melting Point	Approx. 35°C. (Supercools Readily)
Boiling Point at 10 mm.	Approx. 172°C.
Boiling Point at 760 mm.	Approx. 330°C.
Refractive Index at 25°C.*	Approx. 1.613
Specific Gravity at 40°/15.5°C.	Approx. 1.189
Viscosity at 25°C.*	38 Centipoises
Viscosity at 45°C.	12 Centipoises
Weight/Gallon	Approx. 9.9 lbs.
Flash Point	143°C. (289.5°F.)
Fire Point	179°C. (354.5°F.)
*Obtained on supercooled material.	

SOLUBILITY: Practically insoluble in water (either hot or cold). Readily soluble in —

Benzene	Ethyl Acetate	Mineral Spirits
Ethyl Alcohol	Amyl Acetate	Pine Oil
Methyl Alcohol	Ortho-Dichlorobenzene	Turpentine
Ether	Carbon Tetrachloride	Linseed Oil
Acetone	Perchlorethylene	Soya Bean Oil
Methyl Ethyl Ketone	Glacial Acetic Acid	Corn Oil

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BETWEEN THE LINES

Commission Studies Future Liquid Fuel Supplies

Whether or not the U. S. is facing a petroleum famine has long been a matter of controversy, the pros and cons of which have been thoroughly investigated during the past year by the Federal Power Commission. The highlights of the evidence provide an insight into the many aspects of the problem.

THE Federal Power Commission, which concluded open hearings in its year-long investigation of the natural gas industry recently, went extensively into cogent issues affecting both natural gas and competitive fuels. It also dealt with the corollary matter of future fuel supplies of all kinds, which might be available to the nation.

On this latter point, a large body of expert testimony has been developed, mostly within the past year. There are first, the investigation of new petroleum resources in the United States, by the Senate Special Committee headed by Senator Joseph C. O'Mahoney, Wyoming, in which both Government and private witnesses appeared; and the reports on development of oil and gas on public lands, submitted to a Senate committee considering S. 1236—(introduced in the last session at the request of Interior and Agriculture Departments)—for promotion of development of oil and gas on these lands; the extensive reports of the Interior Department's Bureau of Mines work in development of synthetic fuels, and many other sources.

It is possible here to give only highlights from these various sources, including testimony of public and private experts before the Commission's natural gas investigation.

Nor is it intended to state any conclusions at the moment, for, after digesting a substantial part of the data, a reader is virtually free to reach his own conclusions. However, P. C. Keith, president of Hydrocarbon Research, Inc., in his statement before the investigation, pointed out that oil is getting scarcer all the time, and new sources more difficult to locate. On the other hand, he continued, reserves of natural gas have been for some years, and are now, increasing substantially. (*See C. I., p. 58, July, '46.*)

Digressing from his statement, and merely to cite another opinion, J. Edgar Pew, vice-president of Sun Oil Company, who served as chairman of the Committee on Petroleum Reserves of the American Petroleum Institute, testified before the O'Mahoney Committee that "I have found no substantiation for recent contentions that a latent weakness has been disclosed in our domestic oil resources, that we are theratened with a rapid exhaustion of this resource, and that in the very near future we shall be dependent on foreign sources for oil. Certainly the widespread assertion that at current rates of consumption we are only about 14 years away from an oil famine is based on a misunderstanding of the facts."

"Estimated Proved Reserves"

One of the most misunderstood terms in relation to this subject, he added, is that of "estimated proved reserves," which the API has reported, amounts to 20,453,231,000 barrels of crude as of December 31, 1944. Actually, Mr. Pew contended, the term does not mean, as so many have construed it, the total oil reserves of the nation; rather, he emphasized, it represents but "a fraction of the country's total oil resources" even though that fact, except in regard to synthetic products, cannot be established precisely.

"Estimated proved reserves," said Mr. Pew, "constitutes but a stockpile underground for the petroleum industry. In recent years this stockpile has been from 12 to 15 times greater than annual current production, and," he asked, "what other industry maintains a stockpile equivalent to approximately 15 years of peacetime production and equivalent to 12 years of the abnormally high production of the last year of severe war demand?"

During another part of the Senate investigation in which this statement was made, Senator O'Mahoney recalled that at the height of the war, in June, 1944, the United States was producing petroleum at a rate of 4,800,000 barrels a day, or 1,000,000 barrels per day more than in 1941; and that just prior to V-J Day, plans called for production of more than 5,000,000 barrels per day.

At the time the Chairman made his statement, Stewart P. Coleman, Standard Oil Company of New Jersey engineer, estimated that for the short-term period, 1947-50, total crude oil and product demands abroad, in 1947, would total 2,771,400 barrels per day, or 10 percent above 1938, and excluding Russia, which is expected to be self-sufficient by 1947, foreign countries would require about 2,472,000 barrels per day, by 1950. His estimates in this direction were predicated on stabilized world conditions in 1946, which obviously have not arrived, but they present an interesting demand pattern.

These various views are not presented in juxtaposition by way of stating a controversy, but merely to show the scope of data which needs to be considered. Leaving any issues involved wide open, and returning to Mr. Keith, before the FPC investigation, his testimony dealt with alternative fuels to petroleum, on the assumption of growing scarcity of the latter. His company, he said, has a process for manufacturing gasoline and other petroleum products from natural gas, at a Brownsville, Texas, plant. He calculated that about 4 trillion cubic feet of natural gas per year is available, which if used for gasoline manufacture would produce about 800,000,000 barrels per year. He said that with capital and other costs, the total cost of producing this gas, by the process contemplated, would be about 5½ cents per gallon, which is in line with the present cost of gasoline manufactured from crude.

On the basis set forth, he said there is not much reason to feel alarm at reports of diminishing oil supplies; moreover, he added, gasoline from coal is only one step removed, hence there are adequate resources in this country to make available the various petroleum products.

Other Sources of Liquid Fuels

The Federal Power Commission went into the questions of petroleum supply, and alternative fuels, at considerable length during its investigation. Still another contribution has been made by the United States Tariff Commission, which recently furnished a report on petroleum at the request of the Senate Finance Committee and House Ways and Means Committee. This agency stated:

"There are a number of important sources other than petroleum from which liquid fuels can be obtained. These include natural gas, oil bearing shales, oil bearing surface sands and gravels, and coal, together with many vegetable materials."

However, the Tariff Commission added, "Since natural gas is itself an extremely convenient and efficient fuel, it might not be good policy, at least in this country, to convert large quantities of it to liquid form, even if the supplies of gas in the ground should prove to be greater, relative to the requirements, than those of petroleum. Limited quantities of gas can presumably be used in this way to advantage."

The Tariff report, however, complained

(*Turn to page 571*)

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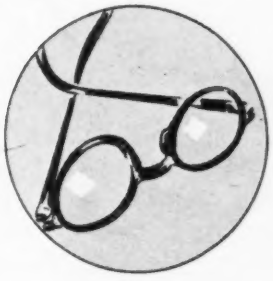

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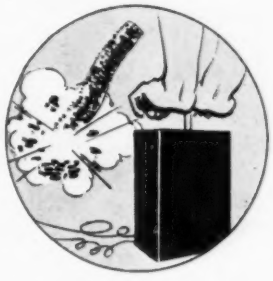
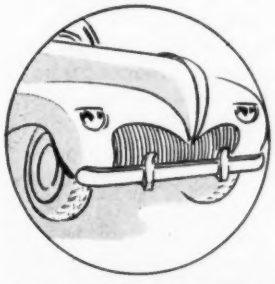
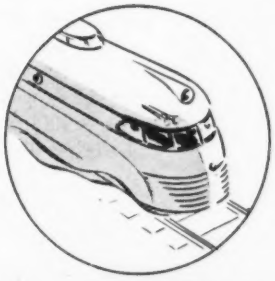
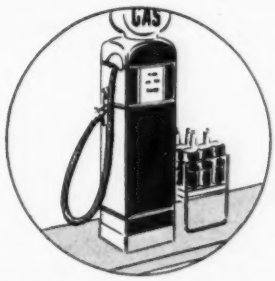


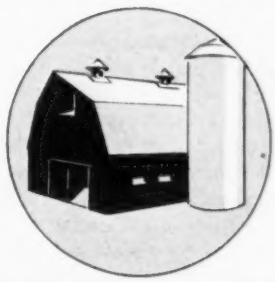
Explosives . . .

Adhesives









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NEW PRODUCTS & PROCESSES

Aliphatic Nitrosulfonates NP 364

A new organic chemical, known as ammonium-2-nitrobutane-1-sulfonate, has been recently announced. This is the first of a series of aliphatic nitro sulfonates produced by The Visking Corporation. It is believed that these materials will find wide utility as chemical intermediates in the synthesis of pharmaceuticals, dyes, detergents, and emulsifying agents. For example, the nitro sulfonates are easily reduced to the amino sulfonic acids, which are higher homologs of taurine. The tertiary hydrogen on the beta carbon atom is highly reactive and can be replaced by a wide variety of reagents. Thus it offers a means of introducing this highly versatile group as a side chain on various nuclei to give new drugs of a more soluble type. It may also be coupled with diazo compounds to introduce the solubilizing sulfonate group, thereby avoiding direct sulfonation on the nucleus. It is available in limited quantities now, but increased production is indicated for the near future. Samples and additional information are available on request.

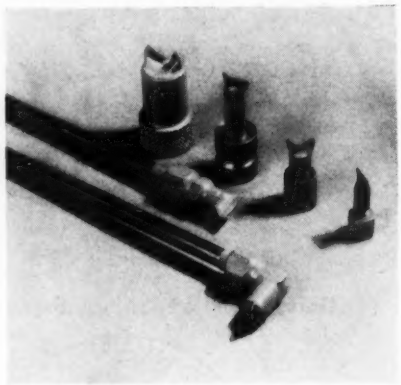
Zinc Stearate Aqueous Dispersion NP 365

A new Beacon Company product is a zinc stearate dispersion in water, with the aid of a wetting agent, which will volatilize at or below the temperature of boiling water. Aquazinc can be used to advantage in the manufacture of cements, neoprene adhesives, coated paper, butyl rubber, and all types of rubber latex. In addition, it offers a convenient method of applying zinc stearate to moulded goods, for Aquazinc can be diluted with water and sprayed on the moulded goods before curing. Because of its water dispersability, many new applications for the use of Aquazinc can be found which the water insolubility of powdered zinc stearate prohibits.

Aquazinc is economical and efficient since it can be applied with uniformity and with no loss. Aquazinc eliminates the dust, inconvenience, fire hazard, and other difficulties accompanying the use of powdered zinc stearate.

Plastic Covering NP 366

A plastic material which can be shrunk over the ends of tubing, threaded pipes and precision machine surfaces to serve as a protective covering during shipping,



storage, plating, painting and fabricating operations has been developed by the General Electric plastics divisions.

Made of tough, durable, highly moisture and chemical resistant material, the covering prevents the entry of possible contaminants into tubing and the damaging of threads.

Available in the form of caps, sleeves and tubing, this specially formulated material can be swollen by allowing to remain in the G-E dilator for from 3-4 hours prior to use. Because the caps, sleeves and tubing swell to 50 per cent over the normal diameter, they can be easily and rapidly applied on an assembly line. The plastic is tough, even when in the swollen state and no splitting occurs when applying.

Mercurial Controls Paper Mill Slime NP 367

New effectiveness and economy in the control of slime in paper mills is forecast by Mallinckrodt Chemical Works through the use of its new Pyridose treatment.. Pyridose is a conveniently packaged form of pyridylmercuric acetate, the highly soluble and effective germicide and fungicide developed by Mallinckrodt during the war years. Pyridose is packaged in paper envelopes each containing a full ounce of the material. An ounce so packaged is all that is required for five to fifteen tons dry weight of paper pulp, the amount depending upon the local conditions and the extent and severity of the infestation by slime-forming organisms. One or more envelopes of Pyridose as required are simply thrown into the beater or other convenient place in the stock preparation equipment. The envelope immediately disintegrates, distributing the treatment evenly throughout the pulp. This avoids spillage and waste, and insures that the effective dose is released in the pulp itself where its action is required.

Pyridose offers the outstanding fungicidal and bactericidal properties of the mercurials plus unusual water-solubility. Furthermore, the compounds formed from Pyridose with the ions common in water are significantly more soluble than the corresponding salts of other organic mercurials. The importance of extra solubility is obvious.

The minimum concentrations of Pyridose required to prevent growth of several common slime-forming organisms in the laboratory have been determined. One part per million of Pyridose inhibited growth of Aerobacter aerogenes, fifteen parts per hundred million inhibited growth of Bacillus mycoides and five parts per million inhibited growth of Aspergillus niger.

Wood Glue NP 368

A new cold-run, fast-setting resin wood glue, "Wood-Lok," has been developed for joint assembly operations by National Adhesives.

Wood-Lok is the only type of resin glue that can be handled and machined after 20 to 30 minutes' clamping time, instead of the usual six to eight hours, producing a strong, resilient bond unaffected by humidity changes.

A war-time "Resyn" development now made available to all wood-working in-

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Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 364	NP 367	NP 370	NP 374	NP 378
NP 365	NP 368	NP 371	NP 375	NP 379
NP 366	NP 369	NP 372	NP 376	NP 380
		NP 373	NP 377	NP 381

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A USEFUL REAGENT

ESPECIALLY FOR REACTIONS INVOLVING ORGANIC COMPOUNDS

Columbia Thionyl Chloride is a colorless to pale yellow liquid possessing an acrid odor similar to that of a mixture of sulfur dioxide and hydrogen chloride. It is useful as a reagent in a variety of chemical reactions, especially involving organic compounds. For example, Thionyl Chloride may be used in the conversion of organic acids to acid chlorides, and in other chlorination as well as in dehydration reactions.

Thionyl Chloride is often superior to phosphorus chlorides for such purposes since the by-products formed, *i.e.*, sulfur dioxide and hydrogen chloride, are gaseous and easily removable. Thionyl Chloride also is useful in introducing sulfur, or sulfur and oxygen, into organic molecules.

Technical Bulletin T-308 presents physical properties and a number of typical reactions. May we send you a copy? Should you wish a sample of Thionyl Chloride for experimentation, please write us on your company letterhead.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION

FIFTH AVENUE at BELLEFIELD, PITTSBURGH 13, PENNA. • Chicago • Boston • St. Louis
Pittsburgh • New York • Cincinnati • Cleveland • Philadelphia • Minneapolis • Charlotte • San Francisco

COLUMBIA ESSENTIAL INDUSTRIAL CHEMICALS

Soda Ash • Caustic Soda • Liquid Chlorine • Sodium Bicarbonate • Pittchlor (Calcium Hypochlorite) • Silene EF (Hydrated Calcium Silicate) • Calcium Chloride • Soda Briquettes • Caustic Ash • Phosflake • Calcene T (Precipitated Calcium Carbonate) • Modified Sodas.

dustries, Wood-Lok has many other outstanding points, according to National's announcement:

It is cold-run; therefore, its bonding quality is never weakened by constant heating. It is a liquid, ready for use. Nothing has to be added, soaked or heated. It does not harden in the pot. Its characteristics never change during shipment, application or use. Its storage and working life is months, not three to four hours. Wood-Lok has no odor. It eliminates "chilled" joints; there is no need to heat the glue or wood, or to heat the room above a comfortable working temperature. It never embrittles nor forms a rock-hard abrasive film to dull saws and knives; and its fast setting speed shortens assembly lines and frees working space.

Wood-Lok glue colors range from uniformly controlled pure white, which dries colorless and leaves no glue line, to darker shades for special uses.

Sudsless Synthetic Laundry Detergent NP 369

Monsanto Chemical Company has announced a new type sudsless synthetic soap which was developed by the company's central research laboratories at Dayton, Ohio, primarily for use in automatic home laundry machines. The detergent does not form suds, will cleanse clothes as easily in hard as in soft water and will not allow the formation of objectionable curds.

Sterox, now being made by Monsanto's Phosphate Division, requires no fats or oils for its production. It will not combine with metallic substances found in tapwater to form insoluble curds which normally cause the familiar greasy washtub ring, leave grayish deposits on rinsed clothes and frequently lead to clogged drains.

In many months of research and testing leading to the announcement of this exceptional detergent, chemists worked closely with manufacturers of automatic home laundries. These scientists also forecast industrial use of Sterox in textile, metal cleaning, commercial laundry and other industries in which quick, thorough, non-injurious cleansing operations are vitally important to production.

Resin Emulsion NP 370

Designed for use in the plasticizing of GR-A films and the polyvinyl chloride latices, such as the Geon latex series used in the treatment of fibers and in the coating of fabrics and paper, a new resin emulsion is announced by Resinous Products & Chemical Company of Philadelphia. Known as Emulsion G-25, this aqueous dispersion of Paraplex G-25 is characterized by non-migration, permanence, resistance to heat and hot oil, and by flexibility at low temperatures. Combinations of the emulsion can be pigmented to give coated fabrics a variety of colors, with ease of application and absence of flammable or expensive solvents greatly widening its application in the plasticizing field.

Emulsion G-25 is a white, medium to low viscosity fluid with the following physical properties: Solids, 48 to 52%; pH, 9.0 to 9.5; lb. per gallon, 8 lb. (approx.). The emulsifying agent used in its manufacture is of the non-ionic type, producing an emulsion with enhanced stability toward electrolytes and an ability to be blended with other emulsions with greater safety, since the emulsifying agent is not precipitated by cation or anion active dispersing agents.

New Plastic Dip NP 371

Plastipak, a moisture, acid and alkali protective coating, that can be applied at room temperature to a product by either dipping or spraying has been announced by Puritan Company, Inc.

It is a resinous compound that dries quickly in air and forms a clear, tough, elastic, transparent or colored film. It adheres tenaciously to the product to which it is applied but can be quickly and easily stripped off in one continuous sheet when desired.

Corrosion Inhibitor For Copper Alloys NP 372

Dr. Johan Bjorksten, industrial research chemist, announces the development of a new brass corrosion inhibitor, now manufactured by the Bee Chemical Co. under the trade name of "Brass Lyfe." It is furnished as a 10% solution of the active material, sulfated coal tar bases, in butyl cellosolve. It is specific for copper, and is not effective on any other metals than copper alloys. It is miscible with oils, lubricants and lacquers, and added to these it completely stops the corrosion of copper-containing alloys, whether this is due to oxygen, organic acids, or amines.

The Bee Chemical Co. also is offering drawing compounds and soluble oils embodying this new brass corrosion preventive.

Aluminum from Waste Dross NP 373

Disclosing further results of wartime research, the Bureau of Mines has released a detailed report explaining profitable methods for recovering aluminum metal and alumina from industrial wastes such as aluminum dross.

This investigation, an extension of an integrated program for producing cell-grade alumina from low- and marginal-grade domestic ores, was undertaken early in World War II at a time when aluminum demands were increasing and enemy action was imperiling imports of foreign bauxite, the major source of our aluminum.

Statistical information collected by the Bureau showed that American aluminum

CHLOROPHYLL

and other

CHLOROPLAST PIGMENTS, OIL, WATER, ALCOHOL AND ACETONE SOLUBLE

Manufactured by

MIDWEST EXTRACTION CO.

Eastern Agents

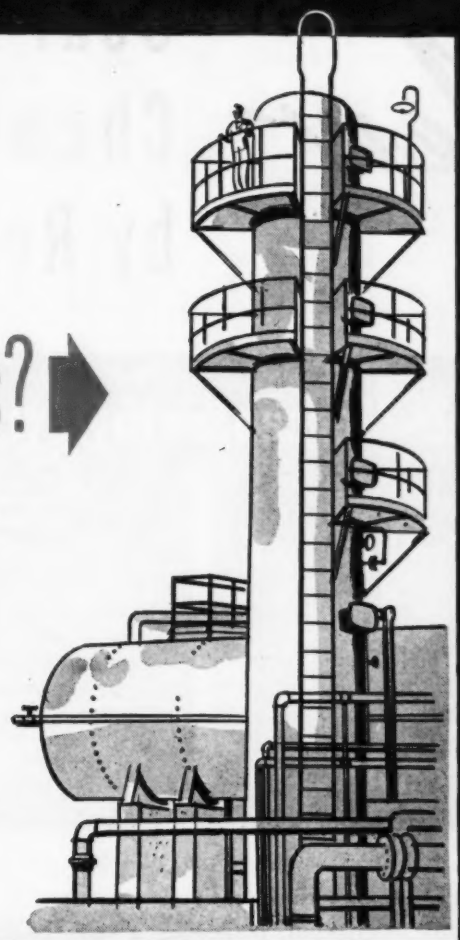
Welch, Holme & Clark Company, Inc.

439 WEST STREET

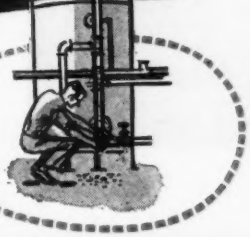
New York 14, N. Y.

Phone — Chelsea 3-6048, 6049, 6050, 6051

Does your Acid Recovery require equipment like this?



OR THIS?



*Amberlite IR-4-B *simplifies acid recovery through "Cold Fractionation"*

Complex equipment can now be replaced in many instances by a simple system of beds of AMBERLITE ion exchange resins. For example, the separation of fatty acid mixtures into their components by preferential absorption is a new and interesting field of application for AMBERLITE IR-4-B—one of the group of ion exchange resins produced by The Resinous Products & Chemical Company.

This "cold fractionation" process has been used to effect almost complete separation of sulfuric and hydrochloric acids. Since AMBERLITE IR-4-B is also adaptable to the separation of organic acids from salts and inert substances, many potential applications are suggested, including:

- Recovery of fatty acids from oils and soap wastes.
- Separation of saturated from unsaturated acids.
- Separation of monobasic from dibasic acids.
- Recovery of tartaric, citric, and ascorbic acids from wastes.
- Isolation of dicarboxylic amino acids.

Our technical staff will be glad to work with you in adapting AMBERLITE Ion Exchange Resins to these or other applications.

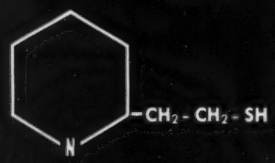
AMBERLITE *is a trade-mark, Reg. U. S. Pat. Off.*

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

New Coal Tar Chemicals by Reilly

2-Mercaptoethylpyridine



PHYSICAL CONSTANTS OF THE PURE COMPOUND

Molecular Weight	139.14
Freezing Point	—25.0 °C.
Boiling Point at 13 mm.	106 °C.
Boiling Point at 39 mm.	134 °C.
Density at 25 °C.	1.084
Refractive Index n20D	1.5605
Solubility in 100 g. water at 20 °C.	0.3 g.
Solubility of water in 100 g. at 20 °C.	10.7 g.

● 2-Mercaptoethylpyridine is a most unusual organic compound, possessing a sulfhydryl group in addition to the pyridine ring. The presence of the sulfhydryl group makes 2-Mercaptoethylpyridine a most reactive and versatile pyridine compound.

2-Mercaptoethylpyridine is available in 95% minimum purity, with a minimum freezing point of —27.4°C. A few of the suggested uses are: as a polymerization modifier in synthetic rubber; as a vulcanization accelerator; as a plasticizer; as an insecticide and fungicide; as a raw material in the synthesis of dyestuffs and pharmaceuticals; as an intermediate in the preparation of sulfides, thioesters and metal salts; as a starting material for the synthesis of pickling inhibitors, flotation reagents, emulsifying and wetting agents and as a solvent.

Further information on 2-Mercaptoethylpyridine and other new Reilly Coal Tar Chemicals will be furnished on request.

This 56-page second edition and supplement describing the complete Reilly line of coal tar chemicals, acids, oils, bases and intermediates will be sent on request.

REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Bldg. • Indianapolis 4, Ind.
2513 S. Damen Ave., Chicago 8, Ill. • 500 Fifth Ave., New York 18, N. Y.

Reilly Coal Tar Chemicals for Industry

plants were discarding each month some 2,900 tons of aluminum dross containing about 9 percent metallic aluminum and the remainder was largely aluminum oxide. As the dross was a potentially far richer source of aluminum than any known naturally occurring ores, it was obvious that recovery of the metallic aluminum and the regeneration of alumina from the nonmetallic portion of the dross would add appreciably to the country's aluminum supply and substitute for ore reserves.

The Bureau then undertook the work now reported, including mechanical beneficiation of aluminum dross, the segregation of metallic aluminum particles from the dross by ore-dressing methods, the recovery of metal by melting, and the chemical treatment of partly demetallized aluminum dross for the recovery of alumina, ammonia, methane, and possibly abrasive-grade corundum.

Rough cost estimates on the most successful recovery processes indicate that raw dross might be beneficated mechanically, the separated metallics melted, and aluminum ingot cast at a gross profit of approximately $28 per ton of dross. Similar cost estimates indicate that a ton of partly demetallized aluminum dross may be treated by a modified Bayer caustic-extraction process at a net profit of at least $22 per short ton. The latter estimate does not include the possible profit that might be realized by sale of the abrasive-grade corundum residue, the authors state.

A copy of the publication, Report of Investigation 3874, "The Recovery of Metal and Other Valuable Products from Aluminum Dross", may be obtained free by writing to the Bureau of Mines, Department of the Interior, Washington 25, D. C.

Silicones for Non-Flammable Oil NP 374

The General Electric Co. has been asked by a large aircraft company for samples of silicone oil for testing purposes following proposals made by the safety bureau of the Civil Aeronautics Board. Orders for the silicone product, considered to be much less inflammable than the petroleum oil now used, followed the projections of new regulations made by CAB after long investigation and study of air line fires.

General Electric has been conducting extensive tests with silicone oil during the war years. According to G. E., the Naval Research Laboratory has also put its stamp of approval on the fluid after exhaustive tests.

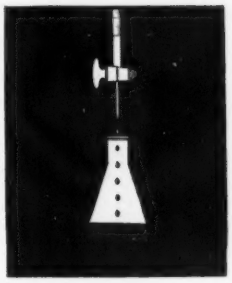
Rubber-Like Plastic NP 375

Elastomer No. 105 is an essentially novel, rubber-like plastic compound manufactured by Electro-Technical Products, Inc. It is sold in the form of a free-flowing, viscous material with a 100% solid content which will cure and polymerize

VETERANS...

May we present this report?

This was a local ad. Think all our chemist friends might be interested!



WHAT *you* did, and how you did it, make a story none will ever forget.

We at Baker do not seek to share any of the honor that was, and is, yours.

We'd like you to think of this report as a tribute, not to Baker, but to *chemicals*.

Chemicals which served you in hundreds of different ways as you fought on land, at sea, and in the air—

Chemicals which made possible much of the equipment you took with you into Africa and Italy—into the Pacific Islands—into Normandy and France and Germany—

Chemicals which helped to guard your health, protect you from disease, aid you if wounded—

Probably, you've never given much thought to the extremely important jobs chemicals did during the war. Perhaps you'd like to know more about these jobs. We list *some* of them for you:

Chemicals for artillery ammunition, trench mortar ammunition, and French rocket ammunition.

Chemicals for smokeless and flashless powder, for colored smoke signals.

Chemicals for compounding of life rafts, wing fuel cells, wiring for planes and battleships.

Chemicals for bombsight lenses, aerial photography, parachute flares, rubber oxygen masks.

Chemicals for delayed action bombs, detonators, filament wires for Signal Corps.

Chemicals for the small tropical battery, water purification kit, shark repellent.

Chemicals for radar tubes, radio parts, communicating systems.

Chemicals for the control of insect-borne diseases, malaria, typhus, yellow fever, dysentery.

Chemicals for the manufacture of gas gangrene anti-toxin, penicillin, pneumonia serums, sulfa drugs, and other medical drugs.

★ ★ ★

The J. T. Baker Chemical Co. is proud that it was associated with the production of all the items listed above, and with many others in helping *you* win the war.

Today, this company is enlarging its building facilities, increasing its organic research work for peace-time projects.

Among the items of specific interest to Baker are products like 2,4-D, a weed killer and DDT, the insecticide for household and agricultural projects.

J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, N. J.
Branch Offices: New York, Philadelphia, Boston and Chicago.

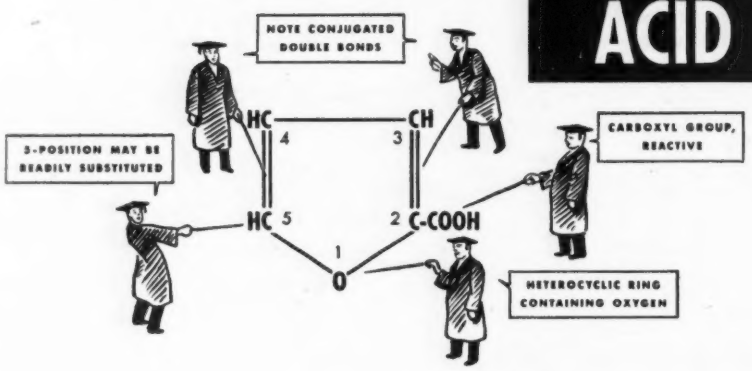
CHEMICALS FOR AN ADVANCING CIVILIZATION

Baker's Chemicals C. P. ANALYZED • FINE • INDUSTRIAL

Crystalline Furan Compound

Storage Stable, Chemically Reactive

FUROIC ACID



HERE is a newly announced material that introduces a Furan nucleus in a notably storage stable form, yet the carboxyl group undergoes esterification smoothly and a variety of other reactions are equally successful. Substitution occurs readily in the 5-position. The conjugated double bonds and oxygen-containing ring present possibilities for other potentially interesting reactions.

Furoic Acid can be nitrated or sulfonated directly without appreciable decomposition. Furoyl Chloride, an important intermediate, may be made by treating the acid with phosphorus pentachloride, thionyl chloride or phosgene.

Uses are in their infancy. A very few have been uncovered. The literature mentions its use to enhance the gloss and drying qualities of paints and as a bactericide and preservative. A hair rinsing preparation, anti-scorch additive in rubber, and intermediate in preparation of esters are other uses which are reported. The esters are useful in perfumery and are claimed to have a strong repellent effect toward flies.

Let us help you evaluate Furoic Acid. Write for Typical Reaction Chart No. 3 which pertains to this acid. The chart is available in 2 sizes: 8½" x 11" file size and 18" x 24" wall size. Bulletin 101 describing Furoic Acid in greater detail and samples are available by request on your Company letterhead. If you have specific questions, ask us.

TYPICAL PROPERTIES

Acidity, as Furoic Acid	99%
Ash	0.5%
Moisture	0.5%
Melting Point	128-129°C.
Color	White to light cream

SOLUBILITY

It is very soluble in hot water, soluble in alcohol, sparingly soluble in cold water, and insoluble in paraffinic hydrocarbons. The ionization constant is reported as 7.1×10^{-4} at 25° C.

AVAILABILITY

Furoic Acid is available at present in limited quantities for research and development. Increased production is contemplated.

The Quaker Oats Company CHEMICALS DEPT.

1920 BOARD OF TRADE BLDG.,
141 W. JACKSON BLVD., CHICAGO 4, ILLINOIS

FURFURAL • FURFURYL ALCOHOL • FUROIC ACID • TETRAHYDROFURFURYL ALCOHOL

by the simple application of heat without pressure. It will not shrink or expand during the curing process, and will take even the finest details of the mold. After curing it becomes a solid elastomeric mass similar to pure gum rubber. It differs from rubber and other plastic compounds in its unusual resistance to most solvents, including aromatic hydrocarbons, oils, acids, alkalies and water, and will not oxidize and harden on aging; will retain its flexibility even at extremely low temperatures; and will not sustain a flame.

The recommended curing temperature is 160° C., however, special compounds may be custom formulated to be cured at as low a temperature as 95° C. The curing time depends on the thickness of the finished product—approximately 5 minutes per ⅛" is required at 160° C.

Freon Extinguishes Gasoline Fires NP 376

Trichloromonofluoromethane — better known commercially as Freon 11, a refrigerant employed in some large air-cooling systems—can be used effectively to extinguish gasoline fires and prevent explosions which exact a heavy annual toll in property and lives, according to the Bureau of Mines.

Other inert gases tested and ranked in descending order of their effectiveness as flame-quenching agents were dichlorodifluoromethane (Freon 12), dichloromonofluoromethane (Freon 21), carbon dioxide, automobile-exhaust gas, and nitrogen. Of the Freon series, dichloromonofluoromethane or Freon 21 probably is the most commonly used in refrigerating and air-cooling systems. Freon 11, the best flame-quenching agent among those tested, now is used in centrifugal compressors feasible only for large refrigerating or air-cooling units.

A free copy of Report of Investigations 3871, "Extinction of Gasoline Flames by Inert Gases," may be obtained by writing to the Bureau of Mines, Department of the Interior, Washington 25, D. C.

Conducting Glass Eliminates Fogging NP 377

Elimination of aircraft windshield icing and interior fogging through use of a revolutionary development of glass research has been revealed by the Pittsburgh Plate Glass Company.

Commercially known as Nesa, the novel idea involves use of a permanent transparent coating for glass that successfully conducts electrical current over the glass panel. Application of the Nesa coating to glass makes it possible to heat the entire area of the panel by a uniform flow of electrical current across the glass surface.

Electrical contact to the transparent coating is made by applying metallic bus bars to the edges of the glass area. The Nesa treatment can be effected on plate

MODEL MG "BOND"

Semi-Automatic Packer, Gross Weigher, Volume Filler

For all types of powdered and granular material

Packaging powders or granular materials in snug cartons or containers with reduced openings is a real problem to many manufacturers of cosmetics, chemicals, drugs, and foods. The Model MG "Bond" Packer is especially designed to overcome this stumbling block. And, it may be optionally equipped as a gross weigher of exceptional accuracy or a speedy volume filler.

The MG "Bond" is a single station, semi-automatic machine capable of handling packages ranging in size up to 14 inches high with a base up to eight inches square or eight inches in diameter. A single operator can fill 25 containers a minute.

Also manufactured by *US* are many other packaging machines, of from one to four stations, either semi or fully automatic. Do you have a problem in packaging? *US* Automatic can fill in the answer.

Send U.S. details on any of your packaging problems —we have the machines and the engineering background to help solve them.

US *Automatic Box Machinery Co. Inc.*

Sales and Operating

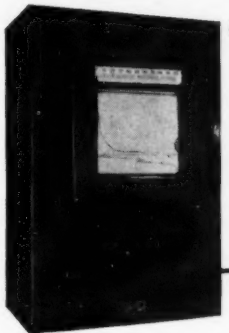
[illegible] MACHINERY CO. & CARTONING MACHINERY CO.

[illegible] ROAD, ROSLINDALE, BOSTON 31, MASS.

[illegible] CLEVELAND

"PRECISION" *Televac*

A POSITIVE METHOD FOR ACCURATE RECORDING AND CONTROL OF VACUUM DOWN TO .001 MICRON (10^{-3} mm HG.)



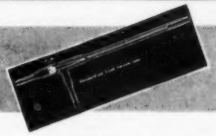
Offering extreme accuracy and continuous trouble-free operation, "Precision" Televac shows unusual promise for all manufacturing and laboratory processes involving vacuum. Incorporating many sweeping changes, this new instrument includes such features as constant calibration, interchangeable vacuum gauges without recalibration, protection against filament contamination, elimination of electrical leakage and continuous self outgassing. An absolute necessity for plant or laboratory control of vacuum processes. Write for detailed Bulletin No. 450-A.

ON THE WAY! A new unit to cover the complete intermediate vacuum range of 700 microns to 10 millimeters.

MODEL S TELEVAC FOR ULTRA VACUUM. This instrument was developed to meet the needs of ultra vacuum processes such as vacuum tube manufacture, deposition of metals and low reflection coatings on glass and plastics and all other processes requiring a vacuum better than 1 micron. To our knowledge no other instrument is available which will accurately indicate and record vacuums down to .001 micron (10^{-6} mm Hg.)

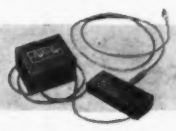
MODEL MR

Model MR Televac provides continuous records of vacuum processes within the range of 0 to 500 microns. Accurate readings are obtainable down to 1 micron. This unit is operated by the 500 thermal gauge and is simple to install. Operates on 115 volts A.C. Due to the stability of this thermal gauge the Model "MR" Televac is adaptable to many vacuum processes that fall within its range.



VACUUM LEAK

This new type vacuum eliminates many of the troubles found in similar instruments now on the market, such as clogging, breakage, time lag, etc.

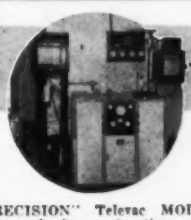


MODEL "500" THERMAL GAUGE

The "500" Thermal Gauge maintains a constant calibration in spite of the presence of oil, water, or other contaminating vapors usually found in vacuum systems

IONIZATION GAUGE

This "Precision-Fredericks" high vacuum gauge, known as type E-31, is the result of years of research and eliminates the "bugs" generally associated with this type of gauge.



"PRECISION" Televac MODEL MR used in conjunction with Blood Plasma Unit

MANUFACTURED BY GEORGE FREDERICKS CO. EXCLUSIVELY FOR

See Your Laboratory Supply Dealer

PRECISION SCIENTIFIC COMPANY

1736-54 N. Springfield Ave., Chicago 47, U.S.A.

Engineers and Builders of Scientific Research and Production Control Equipment

AN IMPORTANT MESSAGE TO PLANT MANAGEMENT

Regarding Control of

SKIN IRRITATIONS

TARBONIS cuts absenteeism! Dermatitis due to chemicals, and ingredients for their manufacture, has been practically eliminated in many plants through the use of TARBONIS.

Not merely a protective, TARBONIS is also effective in clearing up a high percentage of stubborn skin conditions encountered in industry. Easy to apply—nothing to remove. Pleasant, odorless, greaseless, stainless.

THE TARBONIS COMPANY

4300 Euclid Ave. Dept. CI Cleveland 3, Ohio

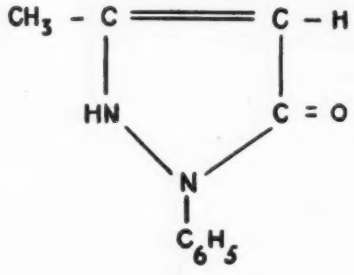
Please send me a good sized jar of TARBONIS and complete information.

COMPANY.....

ADDRESS.....

BY.....DEPT.....

DYES ——— DRUGS



PHENYL METHYL PYRAZOLONE IS A KEY INTERMEDIATE

Winthrop's Quality Is The Highest • Winthrop's Prices Are At a New Low

SEND FOR DESCRIPTIVE PRICE LIST

Special Chemicals Division

WINTHROP CHEMICAL COMPANY, INC.

170 Varick Street

New York 13, N. Y.

glass, laminated safety glass, and multiple-glazed units designed for both civilian and military aircraft.

Development of Nesa treated glass is attributed to the extensive research during the war toward the development of a satisfactory glass for use on radar equipment and for covers for various types of electronic instruments and dials. When untreated glass was used for these purposes, static electricity would collect on the surface and cause deflection of the registering mechanisms of the instruments. A transparent coating was developed during the war years to "drain" the static electricity from the glass instrument panels and covers.

The Nesa coating designed to conduct electrical current over a glass panel for a specific purpose—to de-ice and de-fog—was an extended application of this wartime research, for if a permanent coating could be developed to drain static electricity from the glass, it would be equally possible to conduct electricity across the glass surface for heating.

Brown Pigment NP 378

Brighter, cleaner, and more durable shades of brown colors for industrial enamels, trim paints, wallpaper and other coated papers, textiles, and possibly plastics are forecast in an announcement by the Du Pont Company of a new pigment color under the name "Auric Brown."

The new pigment, which is chemically hydrated ferric oxide and is characterized by an extremely small particle size, promises outstanding resistance to light for a wide range of products, the company said. Since 1941 it has been undergoing field tests for use in automotive finishes, and it was recently announced to this industry in connection with the development of the new "Duco" Metalli-Chrome nitrocellulose lacquer finishes (CHEMICAL INDUSTRIES, 57, July, 1946). It is non-bleeding in the usual paint, enamel, and lacquer finishes.

The pigment will provide new shades for industrial enamels and trim paints where it is expected to show less tendency to chalk from outdoor exposure than standard iron oxide pigments.

Protective Coatings NP 379

Watson-Standard Co. announces a new series of protective coatings known as R Aluminum System as an ideal alternate for white base and finish coatings during their present scarcity. These new finishes make possible smoother base coatings and bright product finishes having eye appeal and durability.

R Aluminum System for black plate will be of definite interest to lithographers, container manufacturers and metal fabricators because of the excellent printing surface on the base coat and the attractiveness of the finish coat. Reflector, stove and heater manufacturers will find the heat-resistant R Aluminum suitable for

Dependable!

HUNT'S POTASSIUM FERRICYANIDE

Yes, you can depend on Hunt's Potassium Ferricyanide to produce sharper lines, stronger contrasts and greater accuracy in making blue prints. And all this adds up to greater economy because the fine quality of Hunt's Potassium Ferricyanide enables you to get more duplicates from a single master drawing.

MANUFACTURED BY

HUNT CHEMICAL WORKS, INC.

271 RUSSELL STREET, BROOKLYN, N. Y.

SUNSHINE STATE POTASH

A PRODUCT OF NEW MEXICO U.S.A.

REG. U. S. PAT. OFF.

MURIATE OF POTASH
62/63% K_2O ALSO 50% K_2O

MANURE SALTS
22% K_2O MINIMUM

UNITED STATES POTASH COMPANY
Incorporated
30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

Stabilizer SN

for

HEAT-STABILITY of Vinyl Resins

A new vinyl resin additive offering

- Effective heat stabilization
- Easy handling — fluid consistency
- Transparency with no clouding
- Solubility and compatibility
- Freedom from fire hazard

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b. in vinyl resin films for heat stability in drying or service.

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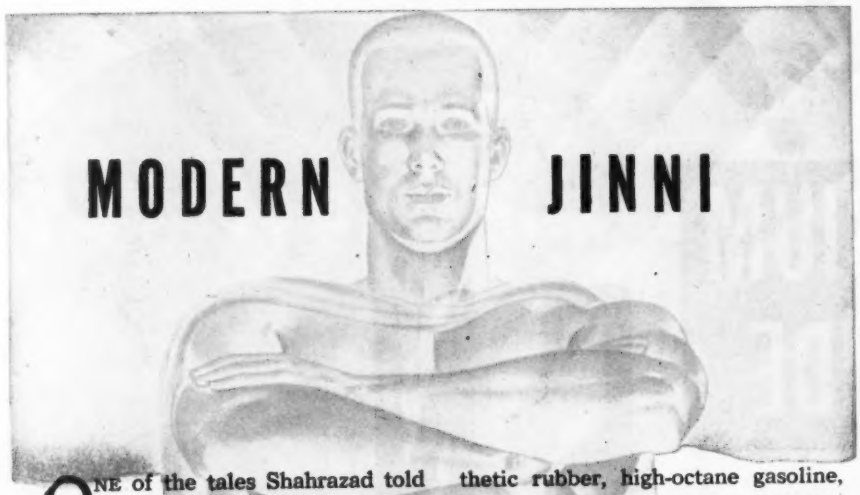

ONE of the tales Shahrazad told her King, during her thousand and one Arabian Nights, was the story of the jinni, sealed in a bottle, who came out at his master's bidding to expand to gigantic size and perform miracles.

Sealed for delivery in a 26-ton tank car, 1,349 cubic feet of liquid Anhydrous Ammonia will, upon release from its steel bottle, make 1,144,000 cubic feet of Ammonia gas. Used as a liquid, or as a gas, or as a basic chemical from which other products are made, Ammonia performs miracles beyond the dreams of Shahrazad.

When liquid Ammonia expands to a gas, it produces cold by absorbing heat. By this process, Ammonia makes ice, quick-freezes fruits and vegetables, refrigerates perishable food and air-conditions buildings.

Ammonia is used in the production of water-purifiers, sulfa-drugs, anti-malarials and vitamins . . . Ammonia serves as a solvent to extract certain metals from their ores . . . Ammonia is a reagent employed in making synthetic rubber, high-octane gasoline, leather, industrial alcohol, alkalies and glass . . .

Metal technologists crack Ammonia (NH_3) back to its original gases, a mixture of Nitrogen and Hydrogen, to surface-harden metals and for use as a protective atmosphere to bright-anneal metals.

Hydrogen, for atomic welding and brazing, is obtained by cracking Ammonia.

Derived from Ammonia are basic Nitrogen components of industrial explosives, plastics, dyes, synthetic textile fibers, dry-cell batteries, flame-proofing compounds, household cleaners and lacquers . . .

Yet all of this is only the beginning. For Ammonia and its compounds and derivatives have literally hundreds of uses essential to America's welfare in peace and war.

To provide you with the everyday magic of this modern maker of miracles, Barrett, pioneer distributor of Ammonia, continues to expand its facilities and improve its service.

Send for your free copy of the booklet Barrett Standard Anhydrous Ammonia.

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use at elevated temperatures. Toy, drum and pail manufacturers will get smoother, tougher, more brilliant coatings formulated to withstand abrasion and severe handling. Paper converters will find them suitable for producing brilliant, embossed, decorative packaging products.

Complete information will be furnished by the manufacturer on request.

Crotonic Esters NP 380

The department of chemical development of Shawinigan Chemicals, Ltd., has announced the development of a series of esters of crotonic acid.

Crotonic anhydride is a colorless liquid with a characteristic odor and is useful in forming cellulose crotonate. Allyl crotonate may be polymerized with vinyl acetate or unsaturated alkyds to give copolymers of improved properties. Butyl crotonate is a colorless liquid with a pleasant persistent odor, soluble in alcohol and ether, but only slightly soluble in water. It has possibilities as a plasticizer and as a modifier for synthetic resins. It can be polymerized with vinyl acetate and other monomers.

Ethyl crotonate is a colorless liquid with a pleasant odor. It is useful as a solvent and softening agent and may be used as a plasticizer for acrylic and methacrylic polymers. Ethylene glycol dicrotonate is suitable for plasticizing cellulose esters. It forms a viscous yellow oil similar to heat-bodied castor oil on blowing with air. Copolymers with styrene give products suitable for injection molding. 2-Ethyl hexyl crotonate should be useful as a solvent and plasticizer. It also shows promise for the perfume industry.

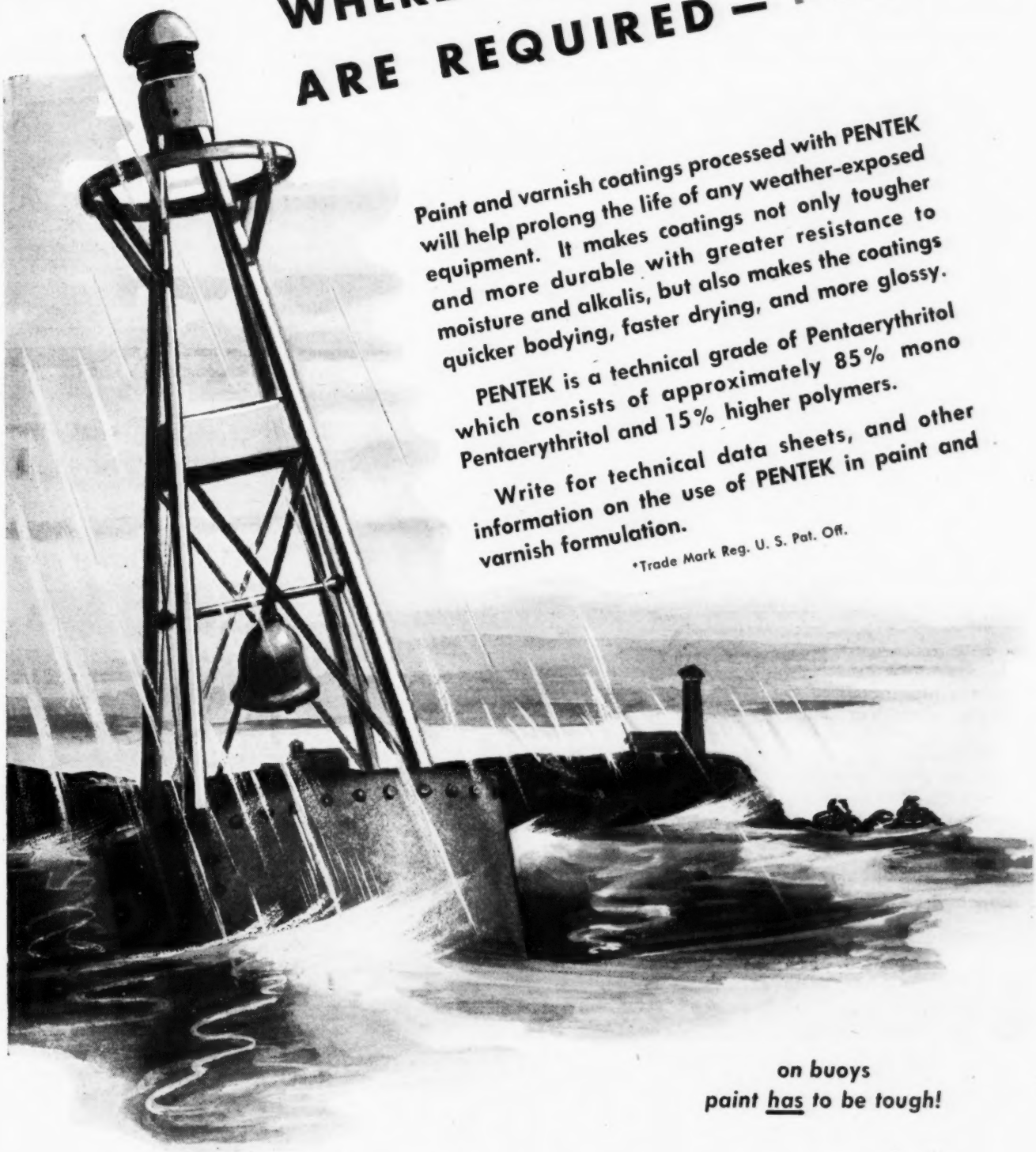
Glycerol tricrotonate ("Tricrotonin") is useful as a plasticizer for cellulose acetate. It gels on air blowing. Isopropyl crotonate is a colorless liquid: the odor is not unpleasant, but slightly sharper than the n-propyl ester. Methyl crotonate is a colorless liquid with a pleasant odor. It is infinitely soluble in alcohol and ether, and practically insoluble in water. Uses as solvent, plasticizer, and organic intermediate are indicated. n-Propyl crotonate is a colorless liquid with a pleasant odor and is useful as a solvent.

Photographic Film to Record Television NP 381

A new 16-millimeter motion picture film has been developed for recording television programs direct from a television monitor or viewing tube, the Du Pont Company Photo Products Laboratory has announced. The film will be used in the television industry in the same way that transcriptions are now used in radio to make permanent records of programs.

This film combines speed with fineness of grain, making is especially adaptable to the recording of television, the company said. It is particularly sensitive to the type of light which is given off by a monitor tube in a television studio.

WHERE TOUGH COATINGS ARE REQUIRED — PENTEK*



Paint and varnish coatings processed with PENTEK will help prolong the life of any weather-exposed equipment. It makes coatings not only tougher and more durable with greater resistance to moisture and alkalis, but also makes the coatings quicker bodying, faster drying, and more glossy.

PENTEK is a technical grade of Pentaerythritol which consists of approximately 85% mono Pentaerythritol and 15% higher polymers.

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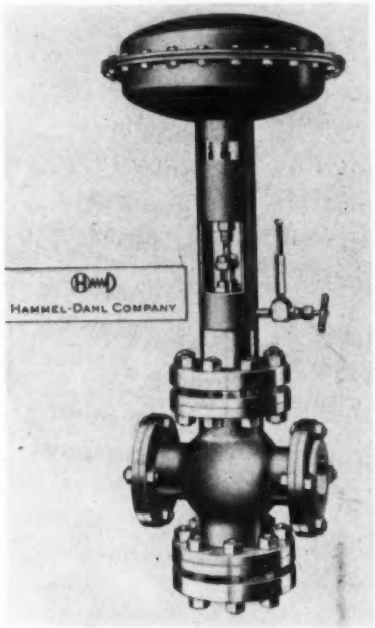
NEW EQUIPMENT

Diaphragm Control Valves QC 928

The Hammel-Dahl Co. offers a new line of Diaphragm Control Valves in



sizes ½" to 1" in alloy construction, either in 304 or 316 stainless steel, or other special corrosion resistant alloys obtainable in cast form.

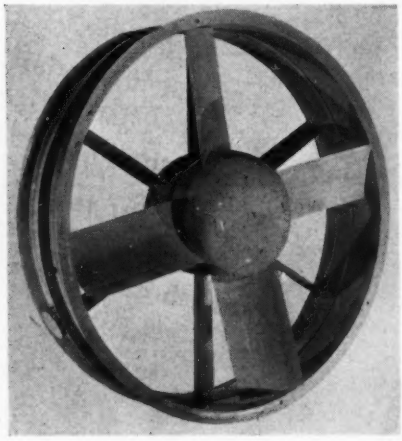
A unique feature of these valves is the use of a single body casting for each size, this body construction being rated at 600# maximum working pressure at 750°F, and also, in the use of split flanges giving a Van Stone type of joint for ASA pressure ratings of 150#, 300# or 600#.

As with all Hammel-Dahl diaphragm control valves, the face-to-face dimensions are in accord with ASA Standards as covered by B16.10-1939.

The use of the split flange construction eliminates the usual difficulty of obtaining sound castings in these alloys. A further advantage of the split flange construction is that valves may be changed from point to point for use at different pressure ratings merely by replacing the removable flanges. The standard air pressure operating range is 2-15 psi; other ranges are available. For high temperature service, airfin bonnets are available.

Fan QC 929

A new fan of monel metal or cold rolled steel is now available from the Moore Co. It is made in 3'-5' diameters and is of the axial-flow ventilating type.



A special high slip, slow speed, direct drive motor, equipped with permanently greased and sealed ball bearings allows the fan to be mounted in any position. An 18 pole; 375 RPM 220 volt, single phase,. or 220-440 volt, three phase motor with an input of 700 watts provides the power. The motor is internally cooled by circulating air within the hub of the fan without drawing in outside air that might be contaminated. The guide vanes on the inlet side of the fan reduce the tendency of the air to corkscrew with the rotation of the blades, which revolve within a ring to reduce tip losses. The large hub eliminates that portion of the blade that has a low peripheral speed and thereby voids the possibility of a backflow of air through the center of the fan.

Liquid Control QC 930

A new unit of Askania Regulator Co. called the "Transometer" now makes possible the control, integrating, remote indicating and recording, of fuel oil and other liquids.

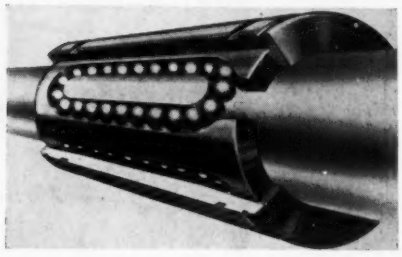
A combination of a piston type, positive displacement meter and a pneumatic signal transmitter, the Transometer is equally valuable with other liquids—particularly viscous fluids because its accuracy is unaffected by viscosity changes.

It is well-suited for applications where wide flow variations are encountered.

To be available initially in ¼"-1" o. d. tube sizes, in all conventional shapes and materials. the fittings will be threaded identically in size and pitch with the corresponding flared fitting.

Ball Bushing QC 931

Thomson Industries, Inc., announces the production of their round shaft type ball bushing. Production of this new antifriction bearing now brings all the advantages and economies that ball bearings



impart to rotary motions. In addition to the reduction of wear, friction and maintenance, ball bushings offer the engineer a solution to two troublesome problems inherent in plain sliding linear bearings.

The oil film, over the exposed surface of the shaft upon which the plain bearing's operation depends, deteriorates due to oxidation and becomes gummy and grit laden. Elimination of the obvious consequences of this condition is a major contribution.

Plain linear bearings require a large length to diameter ratio to prevent cocking and binding. Free rolling ball bushings reduce this requirement.

Standard ball bushing sizes vary from ¼" shaft size to 4". Sizes from ¼" to 1" vary in ⅛" steps; from 1" to 3" in ¼" steps and from 3" to 4" in ½" steps. Production of some of the smaller sizes is now under way. Volume production of the remaining sizes will be started as rapidly as the tooling for each can be completed.

Standardization of ball bushings for square shafts is not yet complete but this

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Please send me more detailed information on the following new equipment

QC 928	QC 932	QC 936	QC 940	QC 944	QC 948
QC 929	QC 933	QC 937	QC 941	QC 945	QC 949
QC 930	QC 934	QC 938	QC 942	QC 946	QC 950
QC 931	QC 935	QC 939	QC 943	QC 947	QC 951

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—We've knocked 2 1/2 pounds off the average charged weight!

The NEW Model 5 Extinguisher

And . . . this harder-hitting, lighter-weight extinguisher *costs no more* than the Model 4 it replaces!

The new Kidde Model 5 *adds* the advantage of increased flame-killing power . . . *retains* the features that led to the widespread popularity of the Model 4. Such features as:

Simple trigger control . . . just aim at the fire, pull the trigger. Fast attack on incipient fires in flammable liquids or electrical equipment. *Complete* freedom from extinguishing-agent damage . . . the dry, clean carbon dioxide cannot corrode metals, harm materials, contaminate liquids. No after-fire mess to clean up.

Get the full facts on the Kidde Model 5 . . . *today!*

Walter Kidde & Company, Inc., 927 Main Street, Belleville 9, New Jersey

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Kidde

type can be furnished on an experimental basis for prototype equipment. Actual production is scheduled for later this year.

Pyrometer Kit QC 932

A new portable pyrometer kit has been introduced by Wheelco Instruments Co. These Model 2863 lightweight kits contain a high resistance portable pyrometer (equipped with a "pistol grip" handle), a straight type extension with adapter for Iron - Constantan surface thermocouple, and an assortment of thermocouples. An additional adapter is furnished for use with the bare and prong thermocouple tips which are also included in the kit.

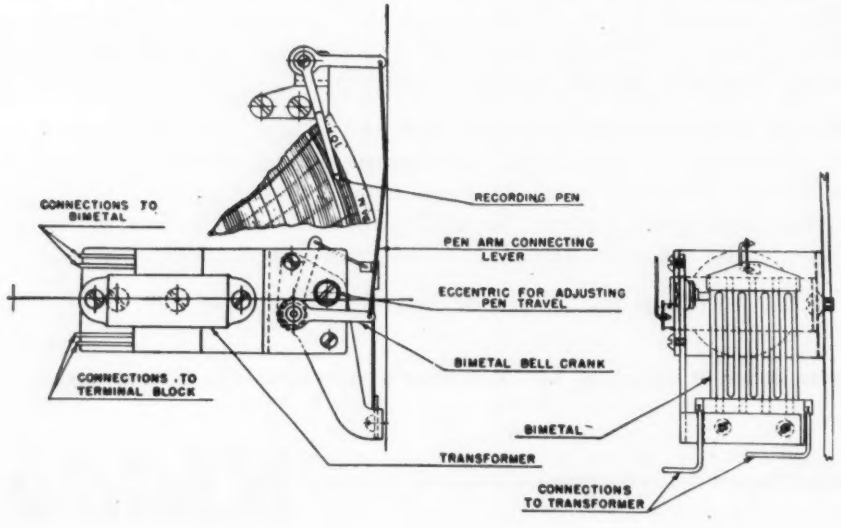
The above items complete with leatherette carrying case provide a handy unit for process control on a variety of applications.

Operation Recording QC 933

An operation recording attachment, as an auxiliary rectangular case instruments unit for recording and controlling pressure and temperature in rubber curing, plastic molding, space heating, refrigerating and centrifugal drying, is being introduced by the Brown Instrument Co.

The auxiliary pen unit consists of an actuating element which is a bimetallic strip through which a current passes whenever the power circuit to the pump, compressor, or other item of process equipment concerned is energized. The resistance of the bimetal to the passage of a current of three and one-half amperes maximum causes it to heat and consequently to warp. The warping or bending action moves the free edge of the bimetallic strip and this movement, in turn, is transferred mechanically to a pen. Because of this action, the unit sometimes is referred to as a warp switch. The pen moves about $\frac{3}{16}$-inch in from the outer edge of the chart and a continuous record of the equipment operation is made.

About 10 seconds are required from the instant the warp switch is energized until the pen is in the proper recording position. Within a period of 30 seconds after deenergizing, the pen returns to the outer edge of the chart. There are no contacts to chatter or stick, nor is there a resistance winding around the bimetal which would require heating and cooling for each operation record, tending to slow up the switch action.



Rubber Covered Return Idler QC 934

Chain Belt Co. has announced a new belt conveyor idler to be known as the Rex roller-bearing style No. 55RC rubber covered spiral return idler. This idler

was designed to combat many of the faults experienced when ordinary return idlers are used under extreme conditions where freezing and ice formation on the rolls or where high abrasive wear on the roll is a problem.

The Rex rubber covered spiral return idler is built of a flat-bar steel helical spiral, covered with rubber. This spiral is mounted on a standard assembly. The steel spiral is accurately machine-formed and permanently welded to the bearing tube. The spiral itself is composed of right and left hand sections to insure centering the belt. Thus, there is no tendency for the belt to laterally drift to one side or the other.

The rubber used is simply opened up and snapped over the bar. The natural tension of the rubber, increased by twisting in following the spiral, holds it in place. In addition, each end is securely clamped. Replacement of the rubber, right on the job, is a simple matter.

Each end of the roll is equipped for high pressure grease lubrication, and is regularly furnished with hydraulic type fitting.

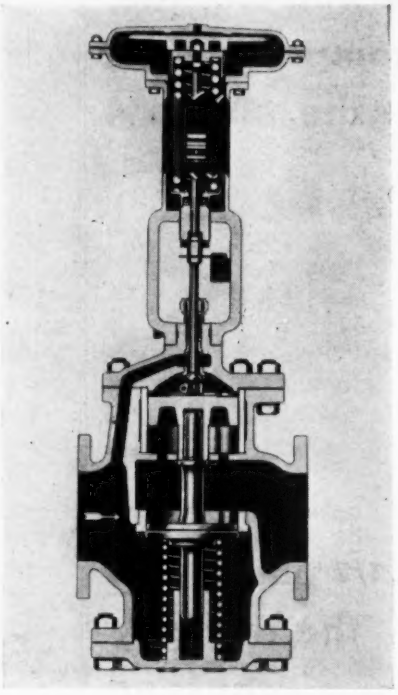
This new idler greatly retards ice forming on the roll in freezing weather because of rubber to rubber contact and what ice may form tends to be loosened by the ever changing point of contact between the belt and spiral. Abrasive and corrosive action, such as results when coke breeze or salt is handled, is reduced to a minimum by the rubber to rubber contact between the idler and the conveyor belt.

It is further claimed that, when sticky materials are hauled by the belt, there is no "build-up" on the spiral because of the shifting point of contact which tends to work the material loose.

Diaphragm Regulating Valve QC 935

A complete new line of single-seated, fully balanced diaphragm regulating valves has been announced by Leslie Co. These diaphragm valves are made with cast iron, bronze, and steel bodies for steam, air or gas pressures up to 1000 psi, and are designed to be actuated by standard pressure or temperature instruments or controllers using 20 psi air or clean water.

Supplied as standard equipment with 800 Brinell hardened stainless steel main valves and stellited seat rings, these single-seated valves provide equal or greater



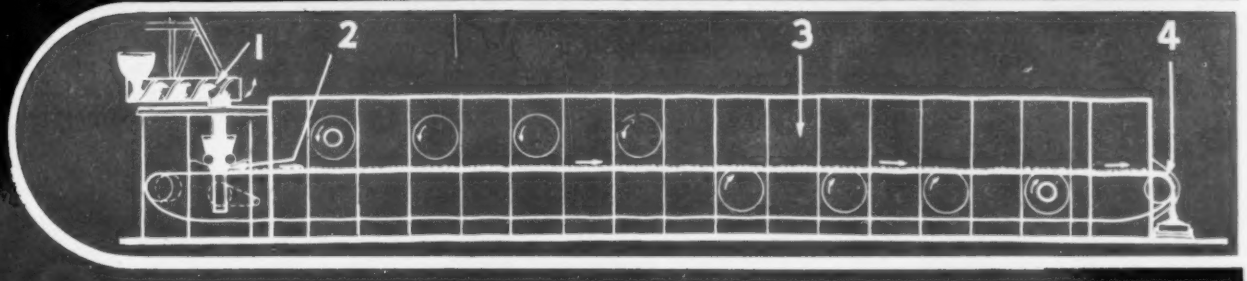
capacities than most double-seated regulating valves of the same size, and have the additional advantage of being absolutely tight in dead-end service, thereby eliminating leakage of fluid commonly experienced in most double-seated diaphragm regulating valves when in closed position.

For temperatures over 450° F., steel diaphragm valves are equipped with a newly designed "Conden-Seal" cooling bonnet that offers a large radiating surface, and the unusual feature of a reservoir of condensate to aid in keeping the stuffing box temperature down.

These diaphragm valves, designated as Classes D-1 (Cast Iron or Bronze) and DS-1 (Steel) are normally supplied with the valve below the seat in closed position, opening with diaphragm pressure.

TOP QUALITY PIGMENT DRIED AT RATE OF 1,820 POUNDS PER HOUR

PROCTOR CONTINUOUS CONVEYOR SYSTEM



Combining a Proctor "pre-forming" feed with a continuous conveyor dryer has been the answer to large scale production, without sacrifice in the quality of finished pigments. By pre-forming the pigment, in its wet-solid state, into small shapes that permit the circulation of heated air through the bed of material on a constantly moving conveyor, production is materially increased. Drying the pigment in the form of small shapes permits the heated air to penetrate *all the way through to the center* of each of the particles on the conveyor. On top of this, the speed of the conveyor, temperatures within the drying enclosure and humidity in the dryer are all accurately controlled. These factors all add up to your assurance that case-hardening or surface baking is absolutely prevented. The systems recommended vary in some details with the particular pigment to be handled. The continuous system illustrated dries pigment from a moisture content of 94.5% (bone dry weight basis) to a moisture content of 0.25% (bone dry weight basis) at the rate of 1,820 pounds per hour. If you have a pigment drying problem, don't hesitate, write today, giving as much information as possible about your problem.

Small extrusions, about ¼" in diameter are formed by the rolling extruder feed of the system illustrated. Heated air quickly penetrates bed of extrusions on conveyor, promoting rapid, thorough drying.

- **1.** Material comes from filter with moisture content of 94.5% (B.D.W.B.*) and is distributed into hopper of rolling extruder feed by means of an oscillating screw conveyor.
- **2.** Wet material is formed into extrusions by automatic rolling extruder feed and loaded to depth 2"-2½" on moving conveyor.
- **3.** Conveyed through an 8 unit single conveyor dryer, air circulation penetrates through bed of material to assure speedy, thorough, uniform drying. Drying temperatures average 300°F.
- **4.** Material is dried to moisture content of 0.25% (B.D.W.B.) at the rate of 1,820 lbs. (C.D.W.†) per hour.

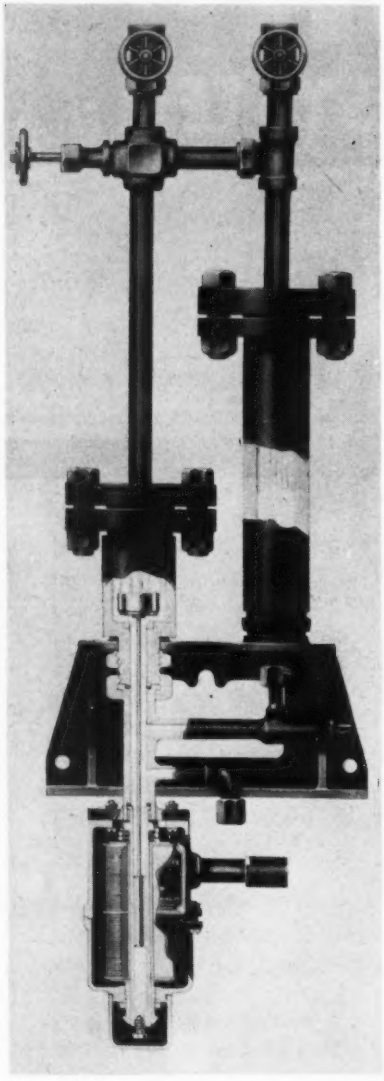
*Bone Dry Weight Basis. †Commercial Dry Weight.

PROCTOR & SCHWARTZ · INC · PHILADELPHIA 20 · PA · P&S

However, by use of a new type reversing superstructure, the valve can be easily changed to a normally open below the seat position, closing with diaphragm pressure, without changing internal parts, removing main body from pipe line, or cutting valve stems.

Flow Meter Body QC 936

Increased response and greater measuring accuracy are two salient features of the redesigned electric flow meter body with a sealed armature of the Brown Instrument Co. Division of Minneapolis-Honeywell Regulator Co. This new meter body is said to be superior to conventional meter bodies for measuring the flow of viscous fluids, such as tar, pitch, tower bottoms, and fuel oil; corrosive agents, such as anhydrous hydrofluoric acid; and volatile substances, such as butane and propane.



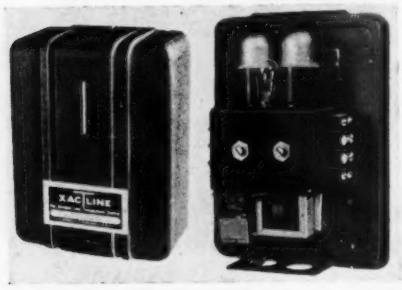
The new meter body with sealed armature incorporates characteristics which to a very great extent minimize the problems sometimes associated with flow measurement, including: (1) requirements for special attachments and accessories, such as external seal pots and purge systems, (2) limitations relative to the viscosity of the fluid in the meter body, (3) *gassing* or the formation of vapor pockets, (4) temperature limitations of the meter body, and (5) limitations relative to the corrosive action of the flowing fluid.

In the conventional electric flow meter body, the inductance coil is located above the float chamber, and consequently the core tube of the inductance coil is filled with fluid being measured. Should this fluid be at a relatively high temperature, the temperature of the inductance coils may rise above the safe operating point. In the new design, the coil is unaffected by heat in the meter body, since it is located below the float chamber and is sealed and protected by the mercury. Because of this location, the piping connection to the orifice may be short and heat may be applied externally to the meter body. Thus, fluids may be heated to render and maintain them in a non-viscous condition.

The maximum working pressure of the sealed armature meter body is 2,500 psi. However, the meter body is factory tested to 5,000 psi.

Temperature Control QC 937

The new Xactline temperature control made by Claud S. Gordon Co. provides unusually close temperature-variation control; variation as low as ⅛ of a degree F. and power "on-off" cycles as short as three seconds have been attained. Xactline accomplishes this without the use of cams, motors, bearings, shafts, gears or other rotating mechanical parts.

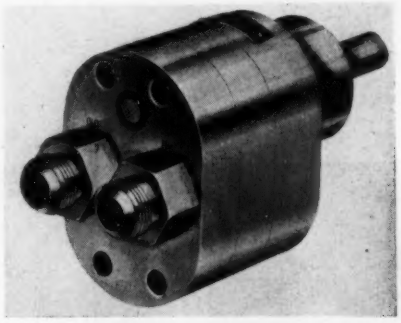


Xactline can be used on all types of electric furnaces, ovens, injection molding machines, etc., employing conventional millivoltmeter and potentiometer type controlling pyrometers or gas-fired equipment employing solenoid-controlled or motor operated valves. It is housed in a cast aluminum case 8¼" high x 6¼" wide and 3" deep, and designed for surface mounting installation.

Hydraulic Pump QC 938

The new series 700 Pump of the McIntyre Co. is designed for high pressure application. This direct drive spur gear pump is a small six pound unit operating with a volumetric efficiency in excess of 90% and a mechanical efficiency in excess of 80%. Four models displace from .4 gal. per min. to 9.6 gals. per min. at speeds ranging up to 1750 rpm against working pressures up to 1000 lbs. per square in. All parts are interchangeable.

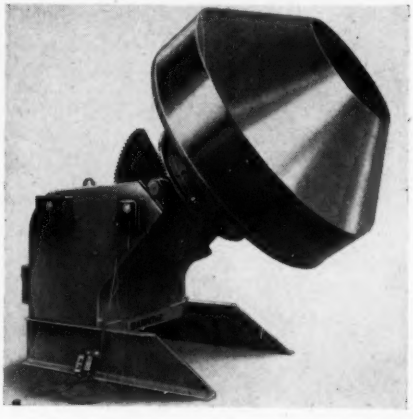
Standard models are designed for direct motor application, but pumps can be furnished for flange, belt, spline and other drives. Power requirements vary between fractional to 6½ hp. The pump body is constructed of aluminum with nitrided nitralloy gears. Positive sealing is accomplished with Linear Packing Double U Cup Seals. Seal chamber pressures are relieved to the suction side of the pump so that excessive seal pressures are never experienced.



Pan-Type Mixer QC 939

A new rotating pan-type mixer has been developed for the candy, drug, chemical, and food industries. Besides mixing and blending, this machine is used for coating, coloring, tumbling, polishing, and finishing on candies, tablets, etc.

The rotating pan is motor-tilted and motor-rotated at constant speed. A variable speed drive can be furnished where needed. The pan is of all metal construction with joints welded and ground smooth. For mixing or blending two or more ingredients, mixing blades are added as necessary to assure thoroughly mixed, uniform batches. With a 135 degree tilting range, materials are completely and cleanly discharged from the rotating pan. Safety limit switches are installed at the two extreme ends of the tilting range. The unit is operated by remote push-button control.



These mixers are available up to 2500 lbs. (50 cu. ft.) batch capacity, and are manufactured by Ransome Machinery Co.

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WATERPROOF BAGS

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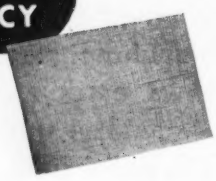
NEWARK *for* ACCURACY



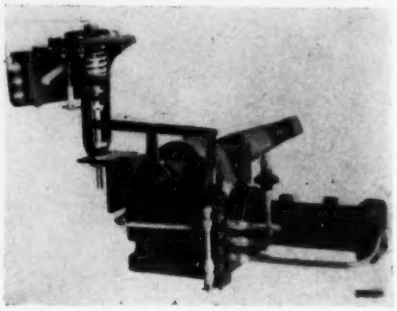
THE FINE WIRE CLOTH of *Accuracy*

Newark Wire Cloth COMPANY

345 VERONA AVENUE NEWARK 4, NEW JERSEY

Booster Cylinder QC 940

A new development of Askania Regulator Co. is an oil operated hydraulic booster cylinder for air operated controllers. Using a standard diaphragm top it



provides high power amplification and permits exact positioning of heavy dampers, valves and the like in accordance with the applied pneumatic loading pressure—usually 0-15 pounds psi.

The cylinder may be of the crank type, as shown, or of the straight reciprocating type. Straight cylinders are available up to 8″ bore and 30″ stroke.

Other types of remote positioning cylinders are available using electric instead of pneumatic transmission.

Controller QC 941

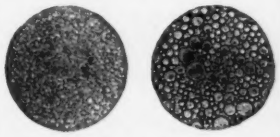
The Model 40 controller of The Foxboro Co. represents no departure in basic operating principles from those of the Model 30, introduced in 1942, but embodies improvements in design and construction which offer many advantages.

Features of the Model 40 may be generalized as a simplification of design, with

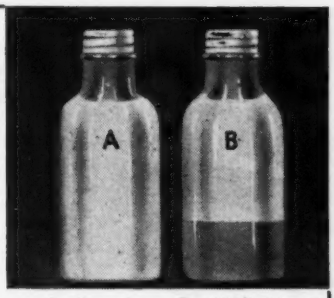
more sturdy unit construction, resulting in superior performance, easier and more flexible adjustments, and new convenience in servicing, including the easy replacement or interchange of unit parts.

The operating-panel feature of "Stabilog" control instruments is retained, and when the case door is open every dial, every adjustment knob, and every part normally requiring attention is immediately accessible, without even the need of removing the chart.

An outstanding characteristic of the



With Hand Homogenizer *Old-fashioned Method*



A—Properly homogenized with Hand Homogenizer. *B—Old-fashioned method; not properly homogenized.*

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MODEL D - 10" STANDARD BAG SEALER

Paper bags can be securely, economically, almost hermetically sealed on the D-10". Folding and stapling operations are automatically performed in a single stroke. The resultant stapled fold is the strongest part of the bag — and it's sift proof.

Saranac Model D-10" is designed to operate at a rate of 75 closures per minute but since output depends upon the skill and ability of the operator, accurate estimates of daily production vary. However, records show outputs of 600 to 800, and even as high as 1200, closures per hour.

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TYGON Paint
U. S. STONEWARE
The ALL-PLASTIC PROTECTIVE COATING for METAL, WOOD, CONCRETE
RESISTS ACIDS, ALKALIES, WATER, OIL, GREASE

Even the best oil-base paints have tough going when exposed to the corrosive-fume-and-gas-laden atmosphere common to heavily industrialized districts.

That's why the chemical industries specify Tygon, the *all-plastic* protective coating, as their standard paint for walls, structural steel, fans, ducts, machines, vats, etc., exposed to chemical fumes.

They have learned through experience that Tygon Paints will give up to three and four times the maintenance-free life of other type coatings . . . that Tygon Paint provides *real protection* against even the most corrosive atmospheres.

You see, Tygon Paints are not affected by oxidation, the destructive force that causes ordinary paints to check, craze, and chalk-off. A Tygon paint film remains chemically unchanged throughout its long life. And Tygon Paint films do not become brittle. They remain flexible, resilient, resistant to impact.

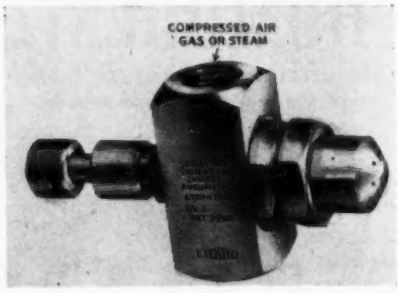
But test Tygon Paint, yourself. Place a trial order today for our special Trial Offer Kit: a quart of Tygon Primer, a quart of Tygon Paint (white, black, gray, green, red, aluminum or clear) and a pint of Tygon Thinner—postpaid anywhere in the continental United States—$5.00.

Model 40 is its adaptability in changing from one type of control to another. Setting of the proportional band, from 0 to 200% or higher, is easily made by the turn of a thumb wheel. Reversal of instrument action is made in a like manner. The range of reset is 500:1 and, although not considered critical, is a continuous adjustment. Elimination of the reset and derivative functions is extremely simple, when desired. A much-improved adjusting device permits zeroing the pen without realigning the control point. A new-type transfer switch enables the operator to change from manual to automatic control, or vice versa, easily and rapidly and with no valve motion.

The Model 40 is made as an indicator as well as a single-pen and multi-pen recorder, and is available for on-off control action, proportional, proportional and reset (Stabilog), proportional with derivative, and proportional and reset with derivative (Hyper-Reset).

Pneumatic Atomizing Nozzle QC 942

A new large-capacity pneumatic atomizing nozzle is now available for ½" pipe



connections from the Spraying Systems Co. Capacities of 20, 40, or 60 gals. per hour are provided by these nozzles, which are built to operate with compressed air although other gases or steam can be used. The nozzles are of the internal mixing type and may be obtained with or without a shut-off needle. Nozzles are made of brass or stainless steel.

Regulator Diaphragms QC 943

With the loss of the prewar goat leather diaphragms used in the regulators of the Askania Regulator Co., it became necessary to develop a highly sensitive, flexible, strong, non-porous material, with an ability to withstand acids and alkalis. These qualities were necessary for the diaphragm to act as a measuring system and to be sensitive to changes as small as .002" W.C. Flexibility is required, as control systems often must operate under continual changing conditions, and the diaphragm is flexing as it measures each of the changes.

Strength is a requisite as diaphragms operate under pressure, and frequently are, through error, subjected to much higher pressures than actually necessary—and a weak material would tend to rupture. Diaphragm material must be non-porous

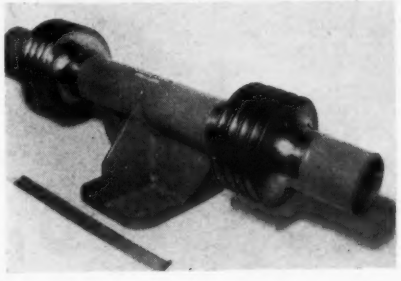
as it is measuring pressure and any seepage would result in inaccurate pressure measurement. The ability to withstand the action of chemicals and gases is essential as the diaphragm generally comes in direct contact with the chemical or gas being handled and therefore must resist its action.

Lacking one or more of the required characteristics — cloth and metal bases were soon discarded and the search narrowed down to Fiberglas impregnated with neoprene.

Packless Expansion Joint QC 944

The MagniLastic Division of Cook Electric Co. announces its new anchor joint, latest in its line of packless expansion joints.

The anchor joint combines rigid anchoring of piping at accessible points, with



allowance for unequal thermal expansion and contraction on either side of the anchor point, due to differences in pipe length, ambient temperatures, exposure, etc. This is accomplished by varying the number of bellows flanges on either side of the anchor base to accommodate each condition encountered. Where severe hydraulic surges within piping occur, anchor joints also minimize the transmission of shock to fittings and adjacent structures.

MagniLastic Anchor Joints are made for standard pipe sizes from ½″ to 24″. The expansion flanges are supplied from any one of the standard MagniLastic 25#, 55#, 150#, 400# or 1000# series, to accommodate all pressures from vacuum to 1000 pounds per square inch. Joints of stainless steel, Monel, Inconel and copper cover all commonly-met corrosive conditions. Temperatures handled range from -300° F. to 1600° F. A variety of standard fittings such as elbows, tees, ells, Y's, etc., can be incorporated into anchor joints to make a single unit. Welding ends are regularly supplied, with pipe flanges and inner linings optional.

Test Kit QC 945

The testing of boiler feed water for hardness, alkalinity and chloride content is readily accomplished with a new boiler room test kit made by The Permutit Co.

The kit, containing solutions and precision-made pippette droppers for accurate measurements, comes in a portable white enamel cabinet, 10″x10″x4¾″. It can be

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We refer to the vapors being removed from thousands of Condensers and Processing Vessels by Croll-Reynolds Steam Jet Evactors. Production Equipment for this apparatus is being pushed to keep up with what seems to be an ever-increasing demand. Now, even more than ever, we are eager to help the operators of the many thousands of Croll-Reynolds Evactors get the maximum performance from existing equipment. New units are still being furnished with surprising promptness.

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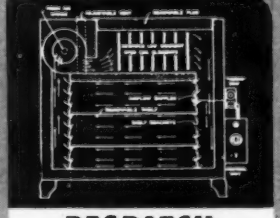

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Powerful fan drives air through heat chamber, down heat duct and into chamber through series of adjustable baffles. Heated air flows crosswise, uniformly penetrates load, and is withdrawn through recirculating duct at left. Assures accuracy, speed, heat uniformity.

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- Expressly designed for critical processing applications, DESPATCH Laboratory Ovens utilize an interbalanced heater-fan-duct system that assures *exact* heat application over a wide heat range, 35° to 260°C.
- This enables you to run any test—such as **pre-aging, drying, baking, moisture determinations, Kauri reduction tests, etc.**—with complete confidence in the results. Will satisfy the most critical technician.
- **FEATURES:** ±1°C. control sensitivity • Fast heat recovery, 2 to 8 min. • Ample capacity (to 37″ x 25″ x 37″) • Guaranteed heat uniformity • 3″ insulation; rugged, compact construction.

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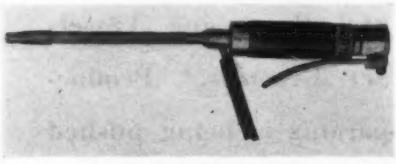
DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

modified to permit the testing of sodium sulfite in boiler water.

Spray Gun QC 946

An improved spray gun for the chemical industries is announced by Lonn Manufacturing Co., Inc. This unit, the "Alspray", is particularly adapted to use of



mild chemicals for various uses.

This improved spray unit operates on the "Lonn Piston Principle", without springs, an internal operation eliminating the hazard of breakage and having only three simple moving parts. It is self-cleaning. Slight pressure bends the hose, delivering air and liquid for spraying. Release of this pressure instantly closes the valve. A special flex handle eases operation where constant use is required.

The "Alspray" is made in two models. One has a straight stem for engine and parts cleaning with an overall length of 14½". The other has a curved stem for use as a motor cleaner, to reach "hard to get at" places, with an overall length of 18". Both are available to fit ¼", ⅜" or ½" air connections. The fluid hose, six feet long, is oil and solvent resistant. All other parts are made of brass.

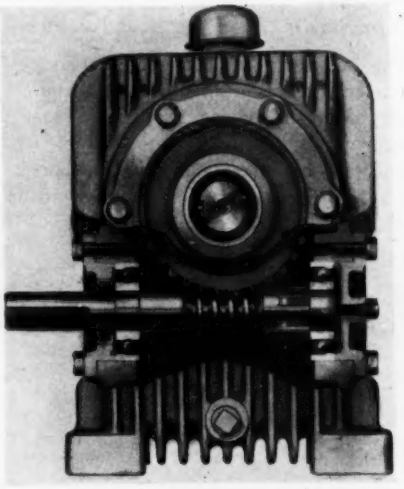
Rotameter QC 947

Fischer and Porter Co. announce the availability of a new rotameter, developed specifically for purge line (bubbler) service. It is a die cast unit with ¼" pipe connections. Four tapped rearward mounting holes allow the meter to be bolted directly to instrument panels.

The new meter has a 38 mm. tube and its 9 sizes meter from 3.5 cc. to 0.90 gal. per min. of liquid or 50 cc. to 0.9 cfm of gas.

Cone Drive Speed Reducer QC 948

A complete standardized line of compact speed reducers, built around double



enveloping cone-drive gearing has been announced by Michigan Tool Co.

The new standardized line includes models with pinion under, pinion over, and with gear shaft vertical. The center distances of from 2" to 18" cover a power-transmission range equivalent to 3" to 24" center distance in worm gearing. This is indicated by the fact that horsepower ratings range up to 800 hp. input to the pinion.

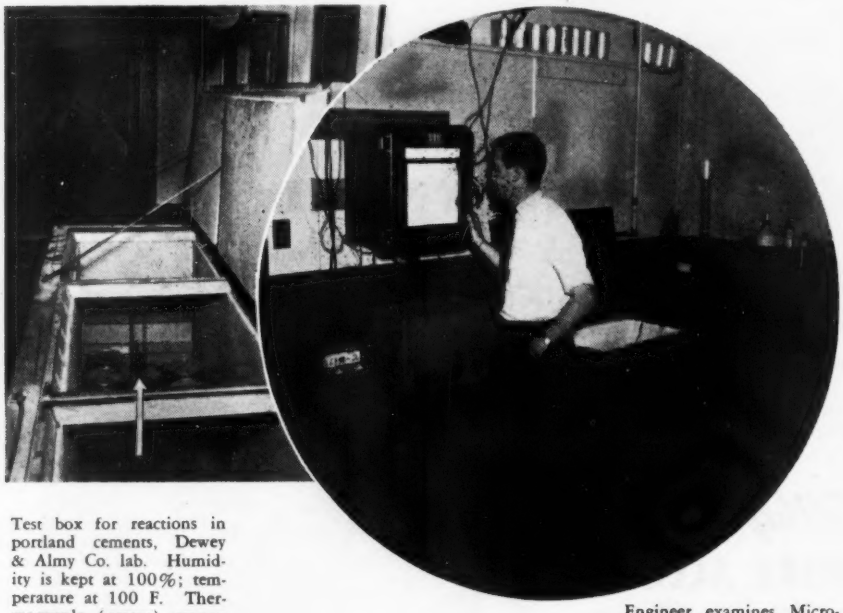
Standardized cone-drive gear sets and standardized cone-drive pinion and gear mountings are used in all models. Assemblies are either right or left hand. Available ratios range from 5:1 to 70:1. Extended pinion and gear shaft models are also available. All parts for any model are interchangeable. The new cone-drive reducers are said to be the first complete line of speed reducers with cooling fins on every model. The fins serve to further increase the rigidity and ruggedness of the housings.

All of the new standard cone-drive reducers from 4" to 18" center distance can be equipped with water cooling coils to provide increased thermal capacity.

The finned housings are all of the box type, resulting in a large oil capacity both for lubrication and for heat conduction. Splash type oiling is used on all the standard reducers.

Elapsed Time Indicator QC 949

Marion Electrical Instrument Co. announces production of the Model HM3



Test box for reactions in portland cements, Dewey & Almy Co. lab. Humidity is kept at 100%; temperature at 100 F. Thermocouple (arrow) reports temperature to Micromax in circle.

Engineer examines Micromax Temperature Recorder used in ASTM and other cement and concrete tests.

MICROMAX "Watches"

ASTM Tests in Dewy & Almy Lab

In testing the cement ingredients they manufacture, Dewey and Almy Chemical Co., Cambridge, Mass., find that their Micromax Recorder has a dependability for measurement and control which fits it for many testing jobs.

Accurate and micro-sensitive across its entire range, the instrument serves six variously-located thermocouples. One detects temperatures in an outside test yard, as a verification of freezing-thawing cycles. Another is located in a calorimeter. A third shows temperature of soil samples, and remaining couples report other information needed to safeguard the quality of Dewey & Almy products.

The features of Micromax which enable it to carry these responsibilities are described in Catalog N-33A, available on request.

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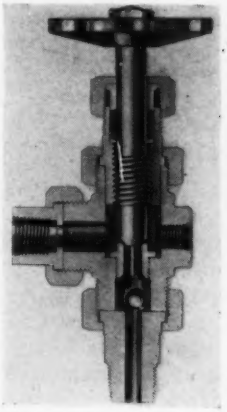
JRL Ad N-33-A-0723 (1d)

elapsed time indicator for operation on 115 volts, 60 cycles, indicating elapsed time from zero to 9,999.9 hours. The unit conforms with standard JAN 1-6 mounting dimensions.

This instrument features the famous Marion Glass-to-Metal Hermetic Seal Construction which makes this unit applicable not only in production and maintenance operation in general industry, but particularly in chemical and allied industries where corrosive fumes or high humidity would attack a conventional instrument, causing early breakdown or loss of accuracy.

Gage-Valve QC 950

Jerguson Gage & Valve Co. announces a new type of gage-valve (No. 64) with



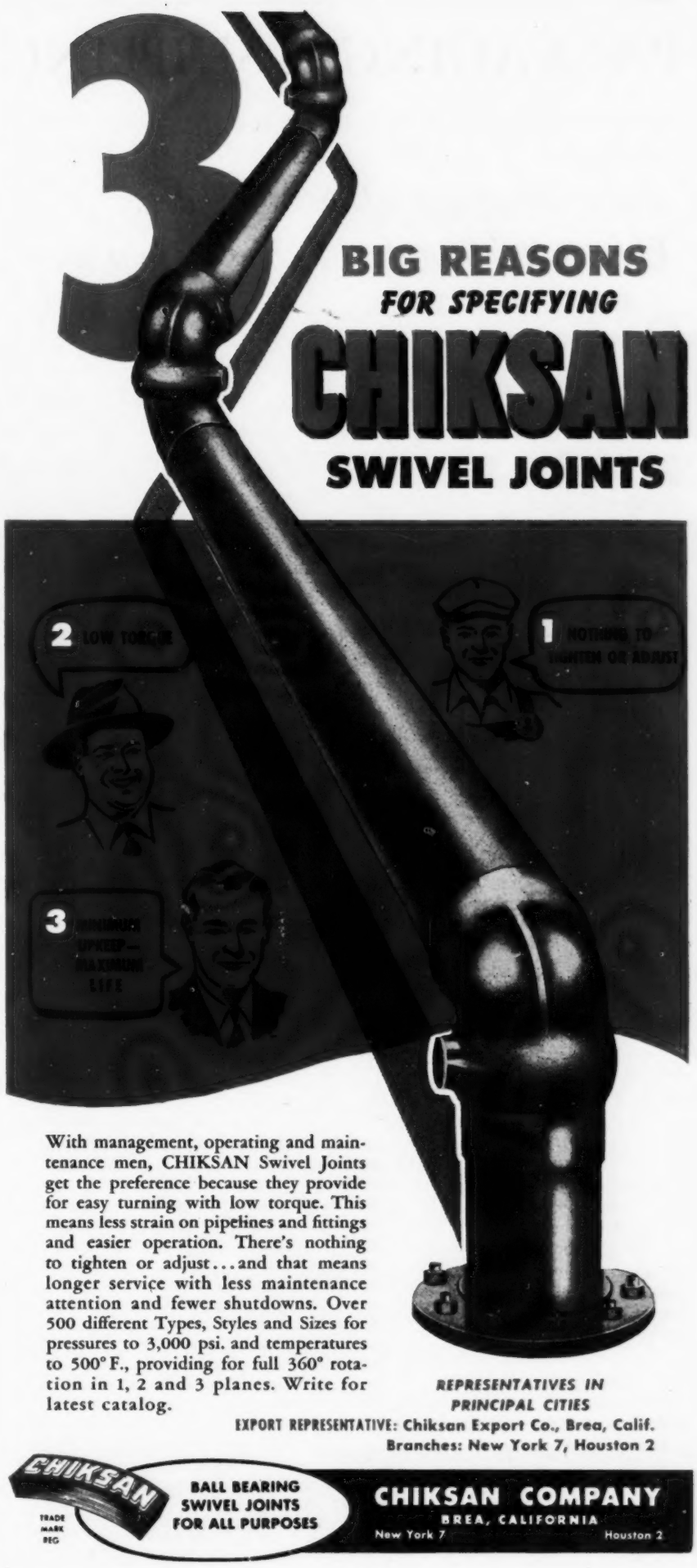
union connection to both the gage and the vessel. This makes it possible to remove the gage for inspection or maintenance without disconnecting the valves. Such a valve is very useful where it would not be practicable to shut down operations for removing the gage. The two valves are merely closed and the union connection to the gage unscrewed for removal of the gage. Operations in the meanwhile continue without interruption.

Pump QC 951

A new, heavy-duty pumping unit with integrally-mounted reduction gear drive has been put into production at the Blackmer Pump Co.

The new pump is designed on the swinging vane ("bucket design") principle, which makes it self-adjusting for wear. It has a capacity of 750 gpm at 150 psi discharge pressure and operates at 225 rpm. The internal construction is bronze-fitted, and units are furnished with either anti-friction or sleeve bearings. The base is structural steel and provides for pump and reduction drive unit only. The prime mover, either engine or electric motor, is mounted separately.

Present plans call for the production of units of similar design with speed variations from 150 to 400 rpm and capacities of 200, 300 and 400 gpm with pressures from 50-150 psi for general industrial as well as marine use.



With management, operating and maintenance men, CHIKSAN Swivel Joints get the preference because they provide for easy turning with low torque. This means less strain on pipelines and fittings and easier operation. There's nothing to tighten or adjust... and that means longer service with less maintenance attention and fewer shutdowns. Over 500 different Types, Styles and Sizes for pressures to 3,000 psi. and temperatures to 500° F., providing for full 360° rotation in 1, 2 and 3 planes. Write for latest catalog.

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PACKAGING & SHIPPING

by T. PAT CALLAHAN

Acute Shortage of Steel Sheets Threatens Supply of New Containers

DURING the forth-coming months, one of the hardest materials to obtain for the fabrication of containers will be steel. A release from the Civilian Production Administration, issued August 1, reads as follows:

T. Pat Callahan

"Increased amounts of steel sheets must be made available to the container industry to assure adequate deliveries of many reconversion materials, the Steel Shipping Containers Industry Advisory Committee told the Civilian Production Administration,

"The committee said that nearly all major consumer products use containers either directly or indirectly. Therefore, they said, if the present lack of steel sheets continues, every major industry in the United States will be affected.

"In the meantime, CPA said, any effort to extend priorities aid would dislocate present distribution of steel sheets, without relieving the present shortage.

"Irving C. White, Deputy Director of the Bureau of Industry Operations, acting Government Presiding Officer of the meeting, assured the committee that 'the Civilian Production Administration recognizes the importance of the steel shipping container industry in its relation to the national economy. However, we must point out to your industry that the relatively short supply of steel sheets is general in all industries.

"'This situation is aggravated by the preferred requirements of the Veterans' Housing Program and the Famine Control Program which must be met first,' he added.

"However, new rolling facilities are expected to be completed in the next six months which will materially relieve the tight situation on flat rolled steel products, CPA representatives told the meeting.

"A 300,000 ton annual increase in steel sheet making capacity was reported by CPA in January (see CPA Release 124) which is expected to be completed by the end of 1946. This new capacity, when installed, will lift total sheet making capacity to approximately 16,000,000 tons annually and should be adequate to take care of essential needs, the agency emphasized.

"CPA said that all consideration will be given to a recommendation of the committee that MM ratings be investigated closely to avoid unnecessary impact on the industry. CPA also agreed to consider the recommendation that the needs of the industry be reviewed with an attempt being made to channel more steel sheets for use in containers.

"It was estimated by an industry representative that container users are now obtaining only 30 to 35 per cent of their requirements. CPA said that the outlook for June indicates that needs will continue to skyrocket and production will drop even lower than May."

CPA issued the following report of May production and unfilled orders for steel barrels, drums and pails, in units:

Type	*Production*	*Unfilled Orders*
Heavy	1,861,445	8,631,644
Light	812,219	2,824,000
Packages, Kegs & Pails	4,264,061	19,398,983
Total	6,937,725	30,854,627

From this release, it can easily be seen that the shortage of steel containers is acute and from all indications will become more acute as time passes. It seems highly advisable in view of this extreme shortage to make an immediate survey of current and potential needs for steel containers. It seems more than likely that the re-use of steel drums, which was discontinued by a great many companies, may be re-established.

A serious shortage also, in addition to the steel shortage, pertains to procurement of specially coated steel containers, particularly galvanized drums.

ODT Revises General Order 18

General Order ODT 18-A Revised became effective August 10, 1946. This revision was caused by the serious shortage of freight cars and has many provisions which must be complied with which did not apply to the superseded order.

Explosives and other dangerous articles transported under the Interstate Commerce Commission regulations for the transportation of explosives and other dangerous articles are exempt from this order. However, shippers of chemicals must abide by the provisions for the shipment of non-hazardous products. For example, under paragraph 500.76 we were requested to show authority only for shipments which were not in compliance with the requirements of ODT 18. Under the new order, a certificate on the bill of lading must be executed for every car shipped. This certificate must show compliance with ODT 18-A Revised. If the car is exempt under the new revised order, this must also be shown on the bill of lading showing reference to the particular paragraph which creates the exemption.

Chairman Johnson of the ODT is determined that there shall be no easing of this new revised regulation, and that the railroads and all shippers must comply to the letter of the law.

Freight Savings On Containers

The most important consideration in the shipment of chemical products is that they shall reach their destination in a safe and satisfactory manner. To this end, a great deal of work has been done by the large chemical companies concerning the type and design of containers which they use. We should like to point out in this article the fact that the container in which a chemical product is shipped carries the same rate in transportation as the product which is contained in it. On account of this, it is necessary to consider the amount of freight involved in the transportation of the package, and, if a container can satisfactorily transport materials with a lesser tare weight than another container, the amount of savings involved in the freight sometimes run into very high figures.

Under the regulations for transportation of dangerous articles, specific containers are designated, but careful perusal of these regulations will show that even though a particular specification is required, a lighter container may be used depending upon the quantity which may be placed within the package. To overpackage not only costs considerably more in the purchase of the container, but adds materially to the amount of freight which must be paid to transport the product. It is obvious that no shipper of chemicals wishes to sacrifice safety or appearance of package by economy in either packaging costs or freight savings. However, we shall attempt to point out a few of the actual savings which have been accomplished by several large shippers of chemicals by decreasing the weight of the package.

A large number of chemicals shipped in inside containers were formerly shipped in wooden boxes. During the past years, considerable progress by the substitution of corrugated and solid fiber board has

WHY IS IT some packages stand out on store shelves and others do not?

Package design and fine reproduction are the obvious answers. But there are many ways a package can be given eye-appeal. For example:

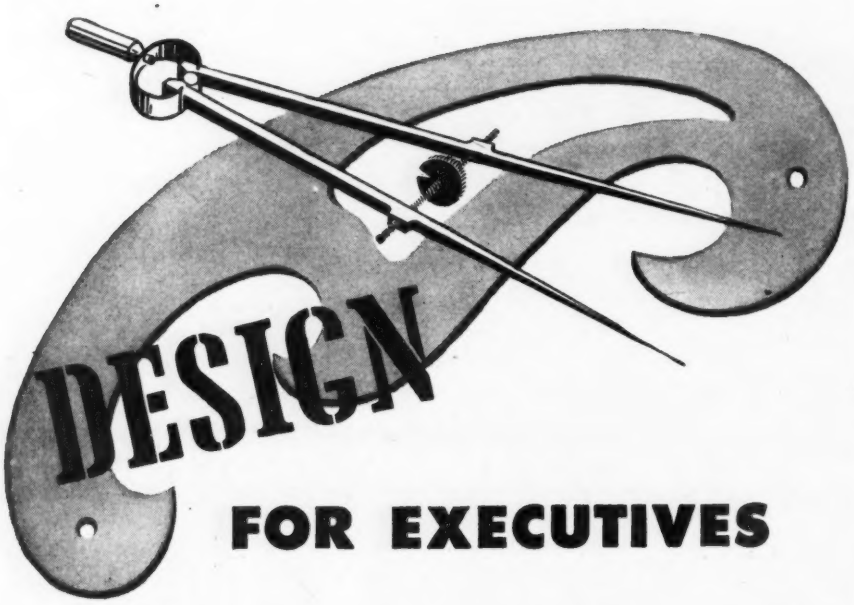
- **Some color combinations demand more attention than others.**
- **Typography can be rugged and masculine, or it can be dainty and feminine.**
- **Art style can be lavish and ornate, or it can be plain and simple.**

That's where Continental's experience and skill come in. Our master craftsmen know how to reproduce your design by modern lithography exactly as you want it.

Remember, whether it's reproduction or actual creation of the design, you can be sure of the finest quality, and best in service, when you come to Continental with your packaging problem.

CONTINENTAL CAN COMPANY

100 East 42nd Street, New York 17, N. Y.



FOR EXECUTIVES

Years ago it may have been all right for a man to start as office boy and work his way up to be president of his organization. The process took years, but there was no better way. Now there *is* a better way.

The design for a successful executive has been "blueprinted." A straight-line production plan has been laid out for *quality* production. The new method fits into today's fast moving conditions, and accomplishes in months what once took years.

The New Way

Through its Modern Business Course and Service, the Alexander Hamilton Institute prepares men for executive positions quickly and scientifically. Institute training is basic and broad. It provides the knowledge that enables men to direct the activities of others—not in one department or one kind of business—but in *all* departments of *any* business. It covers Accounting, Marketing, Finance and Production.

Training of this kind is particularly valuable to technical men who are often denied responsible, high salaried positions because of their lack of business knowledge. The Modern Business Course and Service supplements their technical education, and qualifies them for rapid advancement.

Prominent Contributors

Among the contributors to the Institute's training program are such business and industrial executives as Herman Steinkraus, President, Bridgeport Brass Company; Thomas J. Watson, President, International Business Machines Corp. and Clifton Slusser, Vice President, Goodyear Tire & Rubber Company.

Forging Ahead in Business

The manner in which the Institute's Modern Business Course and Service is brought to subscribers is interestingly told in the fast-reading pages of "Forging Ahead in Business." The booklet also contains a great deal of information about the problems facing ambitious men who are looking ahead—and who want to move ahead.

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been accomplished. Considering the weight factor in this substitution and also the fact that the package is satisfactory for safe transportation, the amount of freight saved by the use of fiber board over wood runs into very large figures. Substantial savings on freight have been accomplished during the past by a careful checking by the manufacturer into the gauge of steel used for all containers between 5 and 55 gallons in size. During the war, when steel containers were especially difficult to obtain, many shipments were made in 18-gauge, 55-gallon drums which were considered to be single-trip containers. These drums, by force of necessity, were returned and re-shipped many times, proving the suitability of a light-gauge drum to withstand severe transportation difficulties. Careful consideration in the use of lighter gauge drums to replace heavy drums will definitely effect freight savings in shipments.

Nowhere in the packaging of chemicals can the savings on freight be obtained in a greater degree than by the shipment of powdered materials in multiwall paper bags. This form of shipment, aside from establishing large savings on the cost of container, also saves very definitely on freight. Regardless of what type of rigid container is used for the shipment of dry or powdered chemicals, the tare weight of the container is very much in excess of the tare weight of sufficient multiwall paper bags to carry the same amount of material. During the war a great deal of emphasis was placed upon the much used phrase "war on weight". There is no better place to accomplish this, now and in the future, than in the chemical business, where huge tonnages of chemicals are shipped in unit packages. Freight adds up to a substantial share of the cost of the finished product delivered to the ultimate consumer.

Technical advances in the manufacture of container materials have provided lighter weight materials that will withstand the same hazards as heavier weight containers. As these advances progress, lighter weight containers will prove adequate. In considering the adoption of a light-weight container, it must be borne in mind that the proper construction satisfactory to withstand hazards must be incorporated into the light-weight container. A weak corrugated fiber board, for instance, could not be construed as being satisfactory if heavier construction is required. But, regardless of the weight of construction for a given shipment, corrugated fiber board will weigh less than a wooden container having a similar strength.

The trend in the construction of box cars in which freight moves, and in streamlined trains in which passengers move, is towards lighter weight and maximum strength. This same trend is evident in the packaging of chemicals, and present progress promises its fulfillment.

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PLANT OPERATIONS NOTEBOOK

Automatic Control Terminology IV

Publication of automatic control terms, as set forth by the American Society of Mechanical Engineers, began in the last issue and will be continued in this and ensuing issues. This list has been compiled by Donald P. Eckman of the Brown Instrument Company division of Minneapolis-Honeywell Regulator Co. and a member of the A. S. M. E. Terminology Committee of the Industrial Instruments and Regulators Division.—Editor.

600 Adjustments of Automatic Controller Action

601 *Neutral Zone* is a predetermined range of values of the controlled variable in which no corrective action occurs.

Neutral Zone is commonly expressed in per cent of controller scale range. A neutral zone is employed in some types of floating controller action. (See Fig. 15.)

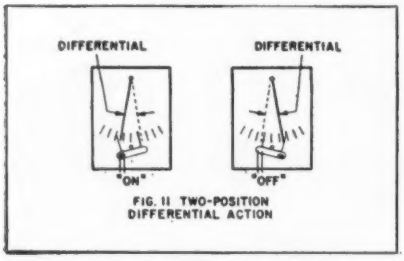


FIG. 11 TWO-POSITION DIFFERENTIAL ACTION

602 *Differential Gap,* applying to two-position controller action, is the smallest range of values through which the controlled variable must pass in order to move the final control element in succession to both of its fixed positions.

Differential gap is commonly expressed in per cent of controller scale range. (See Fig. 11.)

603 *Proportional Band,* applying to proportional-position controller action, is the range of values of the controlled variable which corresponds to the full operating range of the final control element. Proportional band is commonly expressed in per cent of controller scale range, or particularly in the absence of a controller scale, in units of the controlled variable. (See Fig. 14.)

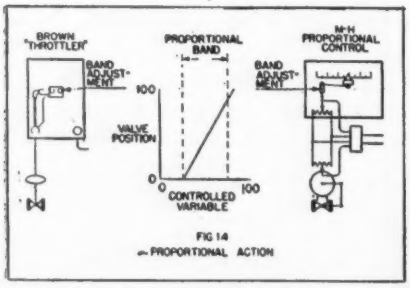


FIG 14 —PROPORTIONAL ACTION

604 *Floating Speed,* applying to single or multispeed floating controller action, is the rate of motion of the final control element.

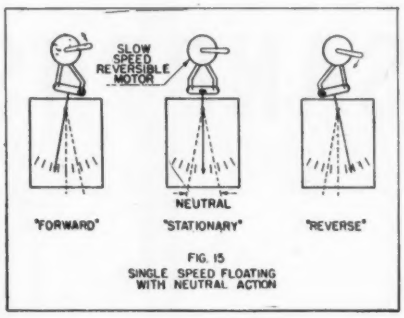


FIG. 15 SINGLE SPEED FLOATING WITH NEUTRAL ACTION

Floating speed is commonly expressed in per cent of full range motion per minute.

605 *Floating Rate,* applying to proportional-speed floating controller action, is the rate of motion of the final control element corresponding to a specified deviation.

Floating rate is commonly expressed in per cent of full range motion per minute per per cent deviation. (See Fig. 19.)

606 *Reset Rate,* applying to proportional plus reset controller action and proportional plus reset plus rate controller action, is the number of times per minute that the effect of the proportional-position action upon the final control element is repeated by the proportional-speed floating action.

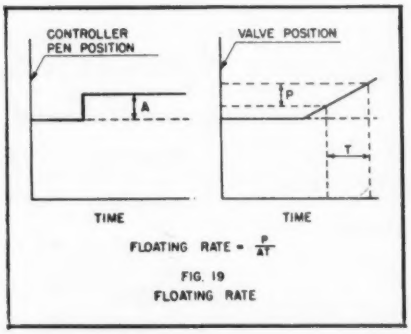


FIG. 19 FLOATING RATE

Reset rate is commonly expressed as a number of "repeats" per minute. It is determined by dividing (1) the travel of the final control element in one minute due to the effect of proportional-speed floating action by (2) the travel due to the effect of proportional-position action, with the same deviation in both cases.

The reciprocal is sometimes referred to as reset time.

In automatic controllers having proportional plus reset action and a reset rate adjustment, the proportional band adjustment simultaneously affects the proportional-speed floating action in such a manner that the reset rate remains substantially constant at its set value. Similarly, in automatic controllers having proportional plus reset plus rate action and a reset rate adjustment, the proportional band may be adjusted without affecting the set value of the reset rate. (See Fig. 20.)

607 *Rate Time,* applying to proportional plus rate controller action and proportional plus reset plus rate controller action, is the time interval by which the rate action advances the effect of the proportional-position action upon the final control element.

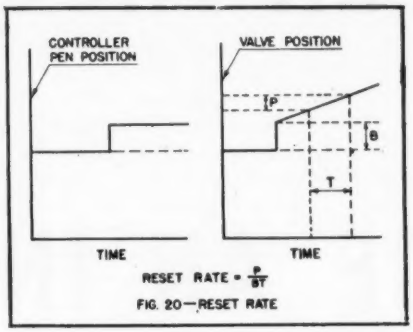


FIG. 20—RESET RATE

Rate time is commonly expressed in minutes. It is determined by subtracting (1) the time required for a selected motion of the final control element due to the combined effect of proportional-position plus rate actions from (2) the time required for the same motion due to the effect of proportional-position action alone, with the same rate of change of the controlled variable in both cases. In automatic controllers having proportional plus rate action and a rate time adjustment, the proportional band adjustment simultaneously affects the rate action in such a manner that the rate time remains substantially constant at its set value.

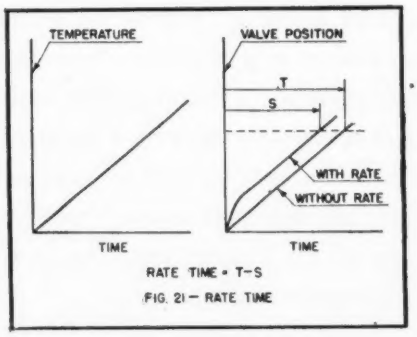
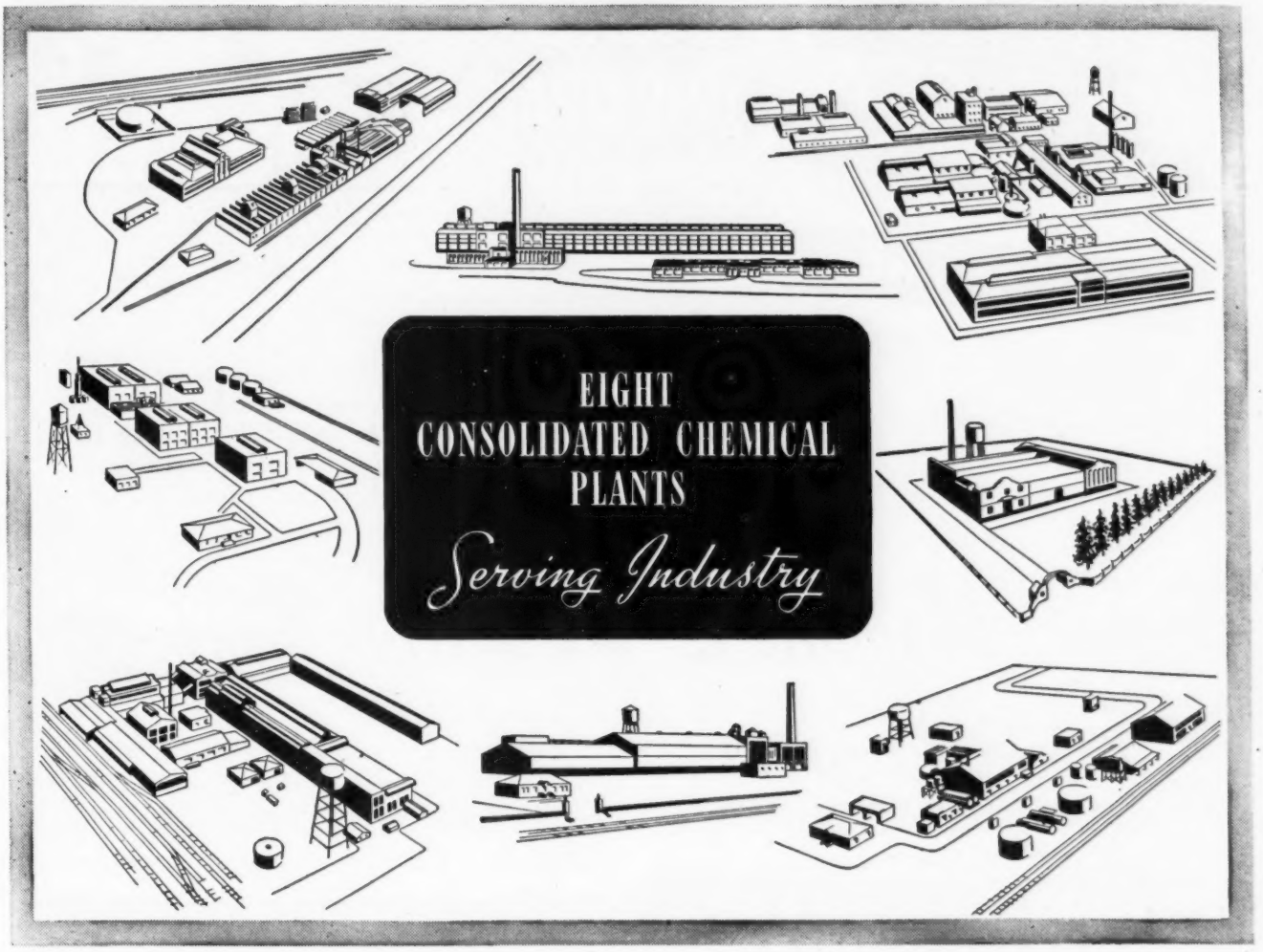


FIG. 21— RATE TIME

Similarly, in automatic controllers having proportional plus reset plus rate action and a rate-time adjustment, the proportional band may be adjusted without affecting the set value of the rate time. (See Fig. 21.)



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Electron Optics and Microscopy

ELECTRON OPTICS AND THE ELECTRON MICROSCOPE *by V. K. Zworykin, G. A. Morton, E. G. Ramberg, J. Hillier and A. W. Vance.* John Wiley and Sons, Inc., New York, 1945. Price $10.00. Reviewed by Charles J. Burton, American Cyanamid Co.

THE APPEARANCE of this book is most welcome to workers in the field of electron microscopy since there has been available no comprehensive treatment of the subject matter in English. In their preface the authors state that the book was prepared with a twofold purpose: "to aid the present or prospective electron microscopist in understanding his instrument and in using it to greatest advantage; and to present systematically the practical and theoretical knowledge which must form the basis for further progress in electron microscope design."

For this reason "Electron Optics and the Electron Microscope" was advisedly divided into two sections: Part I. Practical Electron Optics and Electron Microscopy; and Part II. Theoretical Basis of Electron Optics and the Electron Microscope. Indeed, the division of material is so clear-cut that it might have been preferable to publish each of the sections as a separate volume, since Part I will undoubtedly be of greater general interest to the scientist employing the electron microscope as a tool in his research than will be the mathematical detail of Part II.

The first part of the book opens with an elementary treatment of electron optics and its applications. The various types of electron microscopes are then described and the advantages and limitations of each type are discussed. A considerable amount of space is devoted to a description of the constructional details of the magnetic type instrument including electron sources, lens designs, vacuum systems, power supplies, etc. That these descriptions are devoted so extensively to the early R.C.A. electron microscope is perhaps unfortunate since two later models appeared many months before the publication date of this volume and, although in widespread use, are not mentioned in the text. The last two chapters of this section comprise a discussion of operational techniques, methods of specimen preparation and applications of the instrument to the fields of chemistry, biology and metallurgy. It has obviously been difficult for the authors to select material for these chapters and one might question certain points of emphasis. However, the inclusion of a fairly comprehensive bibliography to a great extent minimizes this criticism.

The remaining 400 pages of the book are devoted to a mathematical treatment of electron optics. There are chapters devoted to electric and magnetic field distribution, electron trajectory tracing in electrostatic and electromagnetic lenses, lens aberrations and methods of correction, high-voltage electron optics and ion optics and finally a chapter on image formation in the electron microscope.

This final chapter is particularly well presented and should, in this reviewer's opinion, be carefully assimilated by everyone concerned with interpretation of electron microscopical data. Although this half of the book because of its mathematical complexity will not enjoy the general popularity of earlier sections, it will undoubtedly be of far greater permanent value.

The authors are to be congratulated for having made available in a unified form this material which was heretofore available only in scattered literature, much of it in foreign languages. The book will undoubtedly be of value both to those using the electron microscope as a research tool and to those engaged in electron optical instrument development.

Research and Regional Welfare

RESEARCH AND REGIONAL WELFARE, *edited by Robert E. Coker.* The University of North Carolina Press, Chapel Hill, N. C., 1946. 229 pp., price $3.00. Reviewed by Harold Vagtborg, Director, Midwest Research Institute.

RESEARCH IN industry has developed through the years to the point where it has placed American industry in the enviable number one international position. Research in regional development represents one of the great new chapters in science working in the interests of man.

The manner in which this same vehicle —research—can bring about economic development in a region is the story in the book "Research and Regional Welfare." The book is a compilation of excellent addresses of statesmen, educators, scientists, and business men presented at a series of meetings at Chapel Hill on May 9, 10, and 11, 1945, during a Conference on Research and Regional Welfare arranged as part of the Sesquicentennial Celebration of the University of North Carolina.

Those who are interested in the economic problems of the South will here find a wealth of sound argument and statistical data which support the point of view that "The South—America's number one economic problem—can, through research, become America's number one opportunity." The speakers are qualified in their fields and, along with many other thinkers throughout the land who have considered the South's regional welfare, are convinced that the encouragement of research is a necessary step toward regional and national welfare.

The papers cover an unusual range of the research opportunities in the South and include able presentations of the subject as related to the humanities, social sciences, nutrition, and public health, as well as industry and agriculture.

The volume opens to the reader a better understanding of the problems of the South and the soundest approach yet advanced for solving these problems—"opportunities through research in the use of natural resources rather than serfdom through subsidy."

Anesthetic Chemistry

THE CHEMISTRY OF ANESTHESIA *by John Adriani. Charles C. Thomas,* Springfield, Ill., 1946. 536 pp., price $7.00. Reviewed by McKeen Cattell, Cornell University Medical College.

IN THIS book the author attempts to bring together knowledge from a wide variety of fields related to anesthesia. The scope is much broader than that suggested by the title, since it includes information on various other drugs which may be of interest to the anesthetist and a great deal of miscellaneous information belonging to the fields of physiology and pharmacology. Actually not more than half the volume is concerned directly with the chemistry of anesthetic agents.

The book is divided into three parts the first of which deals with the inorganic anesthetic agents, which includes, in addition to their chemistry, the physical behavior of gases, the chemical application of the gas laws, and a chapter on the chemical absorption of gases in rebreathing appliances. The second part under the headline "Organic chemistry related to anesthesia," includes chemical descriptions and properties of not only a complete list of compounds used in anesthesia, but in addition a variety of other drugs of interest to the anesthetist, such as the morphine group, local anesthetics, analeptics and autonomic drugs. There are also chapters on the standards of purity and the inflammability of anesthetic agents. The last part is concerned with the biochemistry of anesthesia and presents material on the mechanism of narcosis, the effects of anesthesia on the body fluids and on a variety of physiological functions such as kidney, liver, metabolism, enzymes, vitamins, hormones, etc. There is a chapter on the detoxification and elimination of anesthetic agents, and another on toxicology. The volume concludes with a classified selected list of books and articles, a glossary of special terms and a good index.

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BOOKLETS & CATALOGS

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A987. ACTIVATED CARBON is the subject of a recent booklet (Form 4712) of Carbide and Carbon Chemicals Corp.

A988. ALKALI CLEANERS. "Method of Evaluating Alkali Cleaners" titles a 4-page folder which is available from Nielco Laboratories.

A989. CHEMICALS. Price List. Heyden Chemical Corp.

A990. DDT EMULSION. The Pennsylvania Salt Mfg. Co. has issued a 6-page leaflet describing Pennsalt DDT emulsion and its uses.

A991. DRY ICE is the subject of a 32-page illustrated booklet of The Mathieson Alkali Works, Inc.

A992. GLYOXAL. Carbide & Carbon Chemical Corp. has issued a 2-page leaflet (No. F-5754B) giving the properties of Glyoxal.

A993. OCTADECANAMIDE. "The Armids as Mutual Solvents for Waxes and Plastics" titles a recent 4-page folder which is available from the Armour Chemical Division of Armour & Co.

A994. ORGANIC CHEMICALS. The physical properties and application of more than 175 synthetic organic chemicals are presented in tabular form in a recent bulletin (No. 6136) of the Carbide and Carbon Chemicals Corp.

A995. ORGANIC COATING. "Review of Product Finishing with Organic Coatings" titles a new booklet of The Liquid Plastics Division of Ferro Enamel Corp.

A996. PLASTICS COATING. Tube-Kote, Inc., has just issued a 4-page folder titled "TK-2."

A997. PORCELAIN ENAMELING SUPPLIES. Price list. Ferro Enamel Corp.

A998. RUBBER COMPOUNDING. "Normalization in the Compounding of Rubber and Rubber-Like Materials" titles a 4-page folder issued by Harsyd Chemicals, Inc.

A999. SANTICIZER. The Monsanto Chemical Co. has issued a new technical bulletin (No. 0-D-110) describing Santicizer 160.

Equipment

F821. CHILLING UNITS. Bowser-Kold-Hold sub-zero processing for shrink-fit assembly, tool hardening and gage stabilizing is the subject of a series of booklets available from the Refrigeration Division of Bowser, Inc.

F822. COMPRESSORS. The Cooper-Bessemer Corp. has issued a 20-page illustrated bulletin (No. 338) describing their "GMX" compressor units.

F823. CONCRETE FLOORS. "The Masterplate Metallic-Concrete Floor" titles a recent 16-page bulletin which is available from The Master Builders Co.

F824. CONDENSATE OIL REMOVAL. The Permutit Co. has issued a bulletin describing their pre-formed floc type of condensate oil removal filters.

F825. CONVEYORS. The Metzgar "Power Helper" is pictured and described in a recent 4-page leaflet available from the Metzgar Co.

F826. COOLING UNITS. The Tenney Engineering, Inc., has issued a 20-page catalog (No. CD46) describing their cooling units.

F827. DIALYSERS. "Webcell Continuous Dialysers" titles the recent 4-page folder (No. 5A) of Brosites Machine Co., Inc.

F828. ELECTRICAL PRODUCTS. The Allis-Chalmers Mfg. Co. has issued a 16-page letter-sized handbook (No. B6452) of electrical products.

F829. ELECTRO-PLATING CONVEYORS are the subject of a recent 22-page bulletin (No. FA-102) that has just been issued by the Hanson-Van-Winkle-Munning Co.

F830. EQUIPMENT. "Buying Guide of Allis-Chalmers Equipment for the Process Industries" titles the 16-page booklet (No. 25D6177B) which is available from Allis-Chalmers Mfg. Co.

F831. EQUIPMENT. Ideal Industries, Inc., has issued a 24-page general catalog describing their various products.

F832. EQUIPMENT. Thickeners, clarifiers and agitators are covered in a new 16-page bulletin (No. 31-D) of the Hardinge Co.

F833. EVAPORATORS. The Condenser Service and Engineering Co. has issued a 12-page catalog describing their line of low pressure evaporators and stills.

F834. FIRE EXTINGUISHERS. Carbon dioxide fire extinguishers are the subject of a new catalog section (No. 12035) of The B. F. Goodrich Co.

F835. FIRE HOSE. The B. F. Goodrich Co. has issued a new catalog section (No. 3750) describing and picturing their industrial fire hose.

F836. FLEXIBLE COUPLINGS are the subject of a new catalog (No. 461) which is available from the American Flexible Couplings Co., Division of J. A. Zurn Mfg. Co.

F837. FLOORING. Walter Maguire Co., Inc., has issued a new bulletin (No. 602) describing the use of emery aggregate for heavy-duty floors.

F838. GAS SCRUBBERS AND COOLERS are the subjects of the 4-page bulletin (No.

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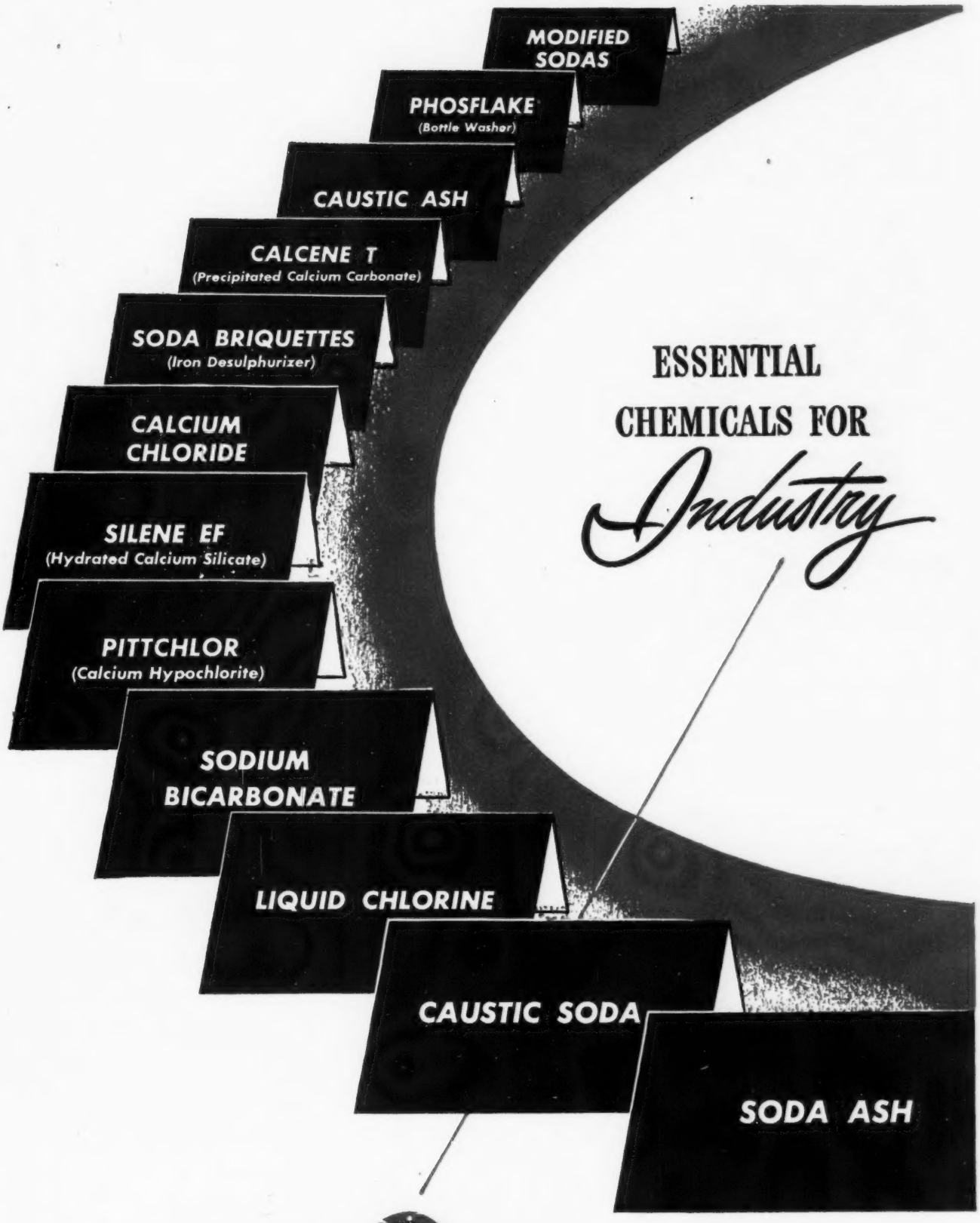

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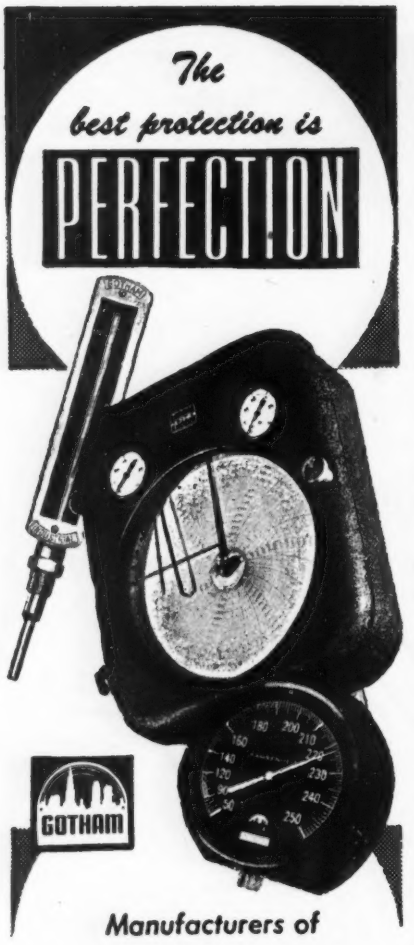

H-202) of the Peabody Engineering Corp.

F839. Gray Iron Castings The permanent mold process of the Foundry Division of Eaton Mfg. Co. is the subject of a 20-page bulletin.

F840. Hard-Facing Alloys are the subject of an 8-page catalog (No. 76) of the Wall-Colmonoy Corp.

F841. Heat Transfer Equipment. "G-R Heat Transfer Apparatus for Chemical Industries" titles a recent 8-page bulletin (No. 1261) of the Griscom-Russell Co.

F842. Horizontal Duplex Piston Pumps are the subject of a 4-page bulletin (No. 230) recently issued by the Warren Steam Pump Co.

F843. Hose Joint. The Flexseal hose joint is the subject of a recent 2-page catalog section (No. 3225) which is available from the B. F. Goodrich Co.

F844. Injection Molding Machine. The horizontal injection molding machines of the Watson-Stillman Co. are the subject of a 12-page bulletin (No. 620-D).

F845. Metal Screens. The McNally Pittsburg Mfg. Corp. has issued a new bulletin (No. 70) titled "Morrow Handbook of Perforated Metal Screens."

F846. Metals and Alloys. Westinghouse Electric Corp. has issued a new 48-page illustrated booklet (No. B-3369) to serve as a guide to the properties and applications of 18 recent metallurgical developments.

F847. Mixers. Sprout, Waldron & Co. has issued a new 4-page book (SM-346) describing and picturing their special mixers.

F848. Oil Flow Measurement and Control. The Transometer is the subject of the 12-page bulletin (No. 111) which is available from the Askania Regulator Co.

F849. Optical Comparators. "Gage 18 Dimensions in 15 Seconds by Optical Projection" titles the recent 4-page bulletin of the Engineers Specialties Division of The Universal Engraving & Colorplate Co., Inc.

F850. Pipe and Fittings. Duriron and Durichlor Split Flanged Pipe and Fittings are the subjects of the 4-page bulletin (No. 704) of the Duriron Co.

F851. Pipe and Tubing. "Big New Economies for Pipe and Tubing Users" titles a recent bulletin which is available from Pratt Industries.

F852. Portable Pyrometers. The line of portable pyrometers of Wheelco Instruments Co. is described in a recent 4-page bulletin (No. D602-4).

F853. Precision Casting by the "lost wax" and a plaster molding process is the subject of a recent bulletin (No. 19B6451) of the Allis-Chalmers Mfg. Co.

F854. Process Controllers are the subject of a recent bulletin (No. 17) issued by Bailey Meter Co.

F855. Pumps. The Ingersoll-Rand Co. has issued a 16-page bulletin (No. 7062) picturing and describing their two-stage Centrifugal pumps.

F856. Screens. Robins Conveyors, Inc., has released a new bulletin (No. 111-A) describing and illustrating the Robins Eliptex Screen.

F857. Servomechanisms are the subject of a 1-page leaflet of the G. C. Wilson & Co.

F858. Stainless Steel Welding Electrodes are the subject of the new 8-page booklet of the Jessop Steel Co.

F859. Supersonics is the subject of the 1-page leaflet which is available from G. C. Wilson & Co.

F860. Synchronous Motors. "Selection and Application of Synchronous Motors and Synchronous Motor Control" titles a recent 24-page booklet (No. 1068) of Electric Machinery Mfg. Co.

F861. Tachometers are the subject of a new 12-page bulletin (No. S1400) of the Bristol Co.

F862. Temperature Recorder. The new inkless temperature recorder recently announced by the General Electric Company is the subject of a new bulletin (No. GEA-4572).

F863. Timing Devices. Counting, timing and recording devices are the subjects of an 8-page catalog available from the Electropet Co.

F864. Vacuum Unit. Details of the new Hydro-steam vacuum unit of the Schutte & Koerting Co. are contained in a bulletin supplement (No. 5-A4).

F865. Valve Control. Master valve control for gravity and large size pressure filters or zeolite softeners is the subject of a recent booklet of The Permutit Co.

F866. Wyndaloy, a hardenable copper, nickel, maganese alloy, is the subject of a 4-page folder of Wyndale Mfg. Corp.

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NEWS OF THE MONTH

Transportation Crisis Threatens Chemical Output

LITTLE recognized, but real enough, is the fact that the U. S. is facing a transportation crisis. The freight car shortage, now, is worse than it has been in the past 20 years, and the peak bottleneck is expected to arise in October and November. Even thereafter, little immediate relief is in prospect.

Naturally, all industries will be hit, and some will be forced to close down. But the chemical industry, in particular, will be affected, for some 96 million tons of chemicals are shipped annually by chemical producers, a full eighty percent of which moves by railroad freight. Too, it is amply evident that water, or truck, transportation facilities are far from adequate to materially ease the situation. For the next three or four months, at least, chemical sales and production may well be governed by the availability of freight cars.

Superimposed on the difficulties which the industry itself will feel in its own shipping departments, will be the chaos caused by delays in the delivery of equipment, raw materials, and containers. Too, the impact of upsets in consuming industries cannot be overlooked.

The squeeze was foreseen by the railroads some months ago, for as early as March they observed the soaring of traffic estimates while deliveries of new equipment bogged down. And therein lies the nub of much of the trouble.

About the most that the railroads can do with present—largely war-weary—equipment is 930,000 carloadings a week. This indicates a shortage, at its worst, of 70,000 cars. But independent car builders have a theoretical capacity of only about 14,000 cars a month; railroad shops can turn out about 2000. However, actual production this year has averaged only a little more than 3000 a month. In the first six months of 1946 the railroads were forced to scrap 29,000 cars, and they got only 18,256.

Nevertheless, one bright spot does appear on the horizon, namely cutting the turn-around time. During the war, turn-around time—the number of days that a car is tied up on a single load—averaged about 14¼ days. But, hauls were longer, and ton-miles per carload were higher. Cars spent more time moving; less being loaded.

Peacetime traffic, on the other hand, takes more cars, even though ton-miles are lower. Cars are loaded lighter, and shorter hauls mean a higher turn-around period. In June of this year turn-around stood at 14¼ days; in July it was pared to 12.7 days. Cutting another half day would mean the equivalent of adding another 50,000 cars to the roads' rolling stock.

If shippers and receivers accede to the suggestion of putting their crews on a six day week, so that cars will not be held over weekends, it will help to alleviate the situation. This may mean overtime, and higher loading expenses, but if it means more cars available, shippers may well find it cheap at the price.

Named du Pont Chief Engineer

Granville M. Read, appointed chief engineer of E. I. du Pont de Nemours Co., Inc., to succeed Everett G. Ackhart, recently retired. Mr. Read, who has been affiliated with du Pont since 1915, *was manager of the company's war plant construction program.*

Potash Output to Fall Short of Demand

Despite a small rise in domestic production of potash, the supply will meet only 60 per cent of the total quantity requested by United States commercial fertilizer companies, the Chemicals Division of the Civilian Production Administration reports.

Established fertilizer firms will get about the same amount of potash allocated to them during the corresponding period last year. Domestic production of potash (potassium oxide) during the period June 1, 1946, through March, 1947, is estimated at 792,706 tons as compared with 780,184 tons for the corresponding period in 1945-46. This small increase, together with a small amount available because of reduced exports and a decrease in the quantity required for indirect military purposes, will be used to meet the requirements of new fertilizer mixing plants.

Glycerine Enters New Era

Ever since 1936, when the commercial synthesis of glycerine was first seriously considered, the pros and cons of its economic advisability have been discussed. This month, a report from the West Coast, suggests that the pros are now dominant, at least as far as one petroleum refiner is concerned, with arrangements being completed for the erection of a $5 million plant with a rated annual capacity of 30 million pounds of synthetic glycerine. Most of the output, which will be available by 1948, is expected to be divided between several large consumers, probably for alkyd resin and cellophane manufacture, on a contract basis.

Thus another chapter is about to be written in chemical history, for never hitherto, since the isolation of the versatile alcohol in 1779, has large scale synthesis been realized. Many reactions were investigated, on a laboratory scale, in the latter part of the 19th. century, and glycerine was produced by fermentation methods in Germany (at high cost) but the only processes thought to hold promise were not developed until comparatively recently.

Foremost, in the field has been Shell Development Co., which has produced pilot plant quantities of glycerine, by the closely controlled chlorhydrination of allyl chloride (made by high temperature chlorination of propylene) or allyl alcohol, and the hydrolysis of the chlorhydrins to crude glycerol. The crude glycerol solution is then evaporated, first in flash evaporators to about 85 per cent concentration, then distilled under vacuum to 99 per cent plus. At a suitable point in this rectification, purification by solvent extraction with xylene, or some such efficacious solvent is performed. Another process, patented by du Pont, utilizes carbon monoxide and hydrogen as starting materials. It involves condensation of carbon monoxide and formaldehyde to glycolic acid, reaction of this acid with a formal, and ultimately alcoholysis of a formaldehyde derivative of glycerol.

The economics of glycerine, both synthetic and natural, are intriguing. Few commodities have been subject to such wide and erratic fluctuations in market price during the past twenty years. In essence the situation bears a striking simi-

larity to that which obtained in methanol and acetic acid prior to the introduction of synthesizing processes.

Quotations on the C. P. grade over the years 1920-1940 have averaged about 16 cents per pound. During this period there have been three peaks, at 28 cents in 1920; 32 cents during 1926-27; and 29 cents during 1937. The lowest trough was reached, following a gradual decline in the post-1929 depression years, at a price of 10 cents in 1933. Today, glycerine sells at 18½ cents, but producers are pressing for an increased ceiling.

Equally significant is the fact that domestic glycerine production, as a by-product of soap operations, has risen from 54 million pounds per annum in 1920 to 184 million pounds in 1939, with output for this year estimated at 165 million pounds. Consumption, in the 1920 period stood at 62 million pounds, at 194 million pounds in 1939, and current demand is placed at 235 million pounds for this year. The oil and fat consumption for soap appears to have levelled off near 1.5 billion pounds annually, which plus the fat splitting industry, means a peak output of 200 million pounds of glycerine.

Particularly noteworthy is the fact, that, with the exception of the depression years, glycerine consumption has levelled off, or declined, during high price periods. As a result, in 1938 domestic stocks were, by the end of the year, at an all time high of 100 million pounds. From this date forward quotations tended to stabilize around the 12 cent level.

Moreover, while glycerine is used in innumerable industries, a full one-half of domestic consumption is channelled to alkyd resins, coating materials, such as cellophane and parchment, tobacco, and explosives. The first two industries are new and expanding, with total demand steadily increasing at a 3-4 million pound per annum rate. Furthermore, the output of alkyd resins varies with the price of glycerine. When costs dip, alkyd resins tonnage burgeons.

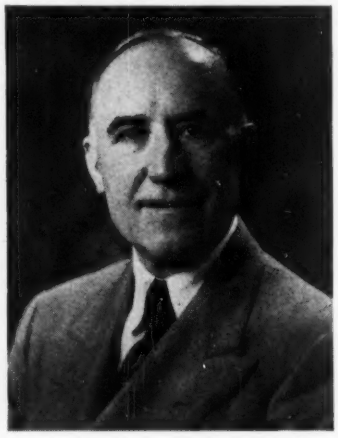
Under these circumstances, the major opportunity for a synthetic process appears to be in its power not only to stabilize prices but also to guarantee a virtually inexhaustible potential supply of high grade glycerine at a basic price. This realization should act as a stimulus to industrial developments leading to new, and wider uses for glycerine; developments which might not be embarked upon in the absence of such guarantees.

Ordnance Plants Converted To Fertilizer Units

Plans have been completed by the Army for conversion of 15 ordnance plants to the production of nitrate fertilizers, most of the output of which will be exported to war-ravaged countries. Schedules call for a monthly production of approximately 70,000 tons of ammonium nitrate.

Nine commercial concerns have been retained as architect-engineers and managers for the projects, namely: Silas, Mason Co., Emergency Export Corp., Bechtel Brothers McCone Co., Hercules Powder Co., Atmospheric Nitrogen Co., Heyden Chemical Corp., H. K. Ferguson & Co., E. I. du Pont de Nemours & Co., Inc., and Liberty Powder Co.

Hughes Joins Ferguson



Leslie C. Hughes, until recently a consulting chemical engineer with The Dorr Co., New York, has joined The H. K. Ferguson Co. in a similar capacity. Associated in past years with Solvay Process Co., Diamond Alkali Co., and American Cyanamid Co., he will be stationed in Cleveland.

Continuous Processing to Boost Dry Color Output

Although the manufacture of colors is one of the oldest activities in the heavy chemical field and the industry was flourishing in this country by the end of the 19th century, past operations have been traditionally batchwise, discontinuous and relatively inefficient. Even today, the chemical pigment industry is largely characterized by batch processes, wooden tanks, and filter presses. Many rule of thumb methods have been preserved and, on the whole, research has centered on short term improvements rather than on broad advances. There has been progress, of course, but no revolutions in production techniques.

In recent years, however, progressive companies in the field have begun to take a new, and more objective attitude, toward accepted principles and practice. Efforts have been made to streamline processes, reduce the number of standards, and to realign research to its more fruitful course.

This trend was highlighted during the month by the announcement that E. I. du Pont de Nemours & Co., Inc., plans the installation of a full-scale process for the continuous manufacture of precipitated pigment colors at its Newark, N. J., plant. Equally significant is the report that Reichhold Chemicals, Inc., has a similar project underway, as an outgrowth of semi-continuous techniques developed, and utilized, at its Brooklyn facilities during the past seven years.

The newer processes will replace batch handling with a continuous flow of raw material and semi-finished pigments through all processing stages. Gone will be the large tanks and vats to mix batches, individual filter presses, and washing operations. Better control of precipitation and drying operations will be realized, to permit closer control of tinctorial strength and other pigment qualities.

In view of the fact that heavy demand is essential for the economical manufacture of pigments by continuous processing, primary emphasis will be put upon the output of zinc yellow—heavy tonnages of which are required for rust-inhibitive primers. Future developments, in the extension to other precipitated pigments, will be dependent upon market developments.

Pyrethrum Sales Mount Despite Synthetics

"Whither pyrethrum?" has long been a question among insecticide manufacturers, particularly in view of the numerous "miracle" products which have been developed in the past decade. Many came to regard the position of this botanical as analogous to that occupied by vanilla and indigo not many years ago. Plainly, it was contended, the day of this natural toxic agent was past—it was doomed to be displaced almost completely by the newer synthetics. But now these opinions are being revised—and justifiably so.

Despite the market success which has been accorded the synthetics, from the thiocyanates to DDT, as a result of the specific and valuable characteristics these newer compounds do possess, pyrethrum has more than held its own. Last year alone, U. S. imports totalled 18,270,000 pounds—up a full 71 per cent over 1944, and establishing a seven-year high. Prospects for future years are equally bright. Never have importers and processors viewed the outlook more confidently.

The growth of pyrethrum sales has been founded on several features. In the first place the botanical—90 per cent of which is consumed in fly sprays—has a uniquely high knockdown value. Its killing power is not as satisfactory as some of the synthetics, nor is it as stable, but spectacular knockdown means much in marketing insect sprays. Too, its non-toxicity to human beings is a sales asset—not too important perhaps in retail marketing, but of major import in bulk sales to food processors, restaurants, etc.

In addition, the range of usefulness for pyrethrum insecticides has been greatly extended of late, by the use of synergistic additives—including oil of sesame and piperonyl butoxide. Such combinations, wherein the action of two or more chemicals produces a total effect greater than could be obtained by independent use of the separate products, is one phenomenon

on which pyrethrum marketers count heavily, to retain their market, and advance with the compounds of synthetic origin.

The aerosol bomb, which provided the Army with a practical and effective method of applying pyrethrum, is also boosting demand for household insecticide sprays, containing both DDT and the natural toxicant. The market for these specialized dispensers is large now, but is still in its infancy. The industry is intrigued by reports that small, cheap, "beer can" type bombs will be distributed as soon as ICC regulations can be cleared. Next spring they should be ready, and will further expand burgeoning insecticide sales.

CALENDAR *of* EVENTS

AMERICAN GAS ASSOCIATION, Atlantic City, N. J., week of Oct. 7.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS will celebrate its 75th anniversary at the Waldorf-Astoria, New York, September 16-18, 1946.

AMERICAN OIL CHEMISTS' SOCIETY, 20th, annual fall meeting, Edgewater Beach Hotel, Chicago, Oct. 30-Nov. 1.

BOSTON CONFERENCE ON DISTRIBUTION, 18th annual, Hotel Statler, Boston, Mass., Oct. 14-15.

ELECTRON MICROSCOPE SOCIETY OF AMERICA and the American Society for X-Ray and Electron Diffraction, joint winter meeting, Pittsburgh, Mellon Institute of Industrial Research and the University of Pittsburgh, Dec. 5, 6, and 7.

INSTRUMENTATION CONFERENCE AND EXHIBIT, Hotel Wm. Penn, Pittsburgh, Sept. 16-20.

NATIONAL SAFETY CONGRESS, Hotel Stevens, Congress and Palmer House, Chicago, Oct. 7-11.

NORTHEASTERN WOOD UTILIZATION COUNCIL, Invitation Conference, New York State College of Forestry, Syracuse, New York, Oct. 2.

PACKAGING INSTITUTE, eighth annual meeting, Hotel Stevens, Chicago, November 25-26.

PAINT INDUSTRIES' SHOW, in conjunction with annual conventions of Federation of Paint and Varnish Production Clubs, and National Paint, Varnish and Lacquer Association, Hotel Claridge, Atlantic City, Nov. 4-6.

Reveal Synthetic Tanning Agent Formulas

The formulas and properties of the most important German synthetic tanning agents and other substitute materials for leather treatment are described in a report now available from the Office of Technical Services, Department of Commerce. Some of these synthetic tanning agents, which were developed by I. G. Farben, are claimed to be superior to natural materials.

Some of the German synthetic tannins, such as the "Tanigan Extra," the "Tanigan Supra," and the "Gerbstoff" products, are adequate substitutes for quebracho and other natural tanning agents, according to the report. Their properties closely resemble those of vegetable tannins, and they can be used to make leathers for a wide range of uses without modification of the tanning procedure.

The other "Tannigans," which were known outside Germany before the war, are not complete tannin substitutes. However, they can be used as assistants in certain tanning processes.

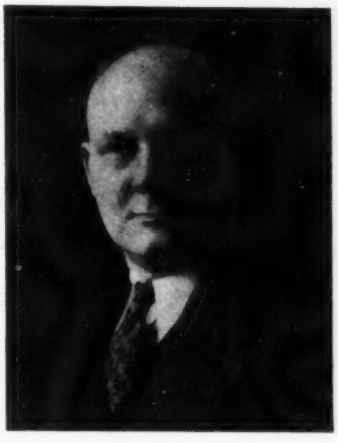
Most of these products are sulphonated derivatives of phenol, aromatic hydrocarbon-formaldehyde condensates, or mixtures of both. In some cases, sulphite cellulose liquor is added to the composition.

WAA Offers Magnesite Unit

A $500,000 government-owned magnesite plant, in Devault, Chester County, Pa., has been declared surplus and is for sale or lease, War Assets Administration announces. The plant, which also produces high calcium lime, may be converted to other uses.

Formerly leased and operated by the Warner Co., the plant is located on a nine-acre, fenced site. It is served by sidings connecting the main lines of the Pennsylvania and Reading Railroads. Secondary roads connect with arterial highways.

Chesnut Heads Wyandotte Pacific Division



Charles O. Chesnut, associated with Wyandotte Chemicals Corp. since 1944, *has been named general manager of the company's recently organized Pacific Coast Division. Mr. Chesnut has also been named president of Natural Soda Products Co. to succeed Stanley Pedder, retired.*

Streptomycin Advances to Commercial Status

Produced in pilot plant quantities by a number of U. S. concerns during the past few months, streptomycin did not attain commercial stature until last month when Merck & Co., Inc., Rahway, N. J., brought in its Elkton, Va., facilities. This plant, on which construction was begun in August last year, produces the antibiotic which is shipped to Rahway for final processing and packaging.

Until now the small quantity of streptomycin available has been distributed by the Civilian Production Administration to meet the urgent needs of the Army, Navy, Public Health Service, Veterans Administration, and also to the National Research Council to carry on an integrated clinical research program to determine the conditions amenable to streptomycin treatment. But, as of September 1, OPA began limited commercial distribution of the antibiotic through designated hospitals for the treatment of civilian patients.

Financed in part by streptomycin producers, the National Research Council Committee on Chemotherapeutic and Other Agents, under the chairmanship of Chester S. Keefer, has summarized 1500 cases reported by physicians from all parts of the U. S. The Keefer report recommends use of the drug for treatment of tularemia, hemophilus influenzae infections, bacteremia due to gram negative organisms, urinary tract infections, and meningitis due to certain specific organisms. Streptomycin has been found to be of questionable value in typhoid fever, brucellosis and salmonella infections and to be ineffective in clostridia infections, malaria, rickettsial infections, virus infections and infections with mold and fungi.

The report includes tuberculosis among a number of diseases for which the drug is a helpful agent but states that in the treatment of these its status has not been definitely defined. It emphasizes that streptomycin will not replace any of the established forms of treatment and that it should not be used as a substitute for other forms of therapy.

Plan Engineers' Salary Survey

The earnings and economic status of professional engineers before, during and after the war is the subject of a survey being made cooperatively by six professional societies and the U. S. Department of Labor.

This is the first major survey of the economic status of engineers since 1935, when, at the request of the American Engineering Council, the Bureau of Labor Statistics reported for the years 1929 to 1934. (B.L.S. Bulletin No. 682.) The new survey will supply information for the years 1939, 1943 and 1946. The data are to be collected by means of mail questionaires, which will be completely anonymous.

The objectives of the survey are to:

1. Permit individual engineers to compare their own status with that of others in their own engineering field and to appraise opportunities in other fields of engineering.
2. Assist employers in establishing appropriate salary scales.
3. Aid in the improvement of the economic status of engineers.
4. Provide information to schools and other institutions engaged in training or in vocational guidance of prospective engineers.

Members of the Survey Committee are Wm. N. Carey, American Society of Civil Engineers; L. W. Bass, American

Institute of Chemical Engineers; E. G. Bailey, American Society of Mechanical Engineers; Mark Eldredge, American Institute of Electrical Engineers; Ernest W. Ellis, American Institute of Mining and Metallurgical Engineers; and Alex Van Praag, Jr., National Society of Professional Engineers.

Chemicals Wanted

The following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33 Federal and Dearborn Sts., Chicago 16.

1,1'- or 2,2'-Diazoaminonaphthalene
a-Chloro-p-xylene
1,4-Di (chloromethyl) benzene
α, α-Dichloro-p-xylene
α, α', α',-Trichloro-p-xylene
α, α, α,-Trichloro-p-xylene
Methyl isothiocyanate
Ethyl isothiocyanate
o-Iodoaniline
o-Fluoroaniline
m-Iodoaniline
m-Fluoroaniline
Calcium dimethydithiocarbamate
Potassium pyrosulfate
Triolein
cis and trans-1,2-Dichloroethylene
Anhydrous calcium nitrate
1,2-Pentanediol
1,3-Pentanediol
1,5-Pentanediol
2,3-Pentanediol

Celanese Wins Stay Suit

Supreme Court Justice Henry Clay Greenberg has granted the Celanese Corporation of America a temporary injunction to restrain American Aniline Products, Inc., and its president, Bernard R. Armour, from abrogating a contract entered into in 1924.

Under terms for the agreement, the plaintiff placed at the defendant's disposal certain trade secrets and formulae for the manufacture of "SRA" dyes. The defendant was under obligation to manufacture dye stuffs solely for and to the order of the plaintiff as the company may direct and order in writing.

In his decision Justice Greenberg pointed out that the plaintiff had advanced substantial sums of money and extended considerable credit to the defendant and from time to time in order to assist in developing the program outlined in the contract had invested more than $400,000 in stock of the defendant.

Justice Greenberg concluded: "A careful examination of the papers convinces the court that the parties ought to be compelled to continue operations under this written agreement of more than twenty years standing until trial of this action."

COMPANIES

Monsanto Boosts Polystyrene Production

Coincidental with the acquisition of the 50,000 ton styrene plant which it built and operated for the government during the war at Texas City, Texas, Monsanto Chemical Co., St. Louis, revealed that it will install a polymerizing unit at this location and enlarge its plant facilities at Springfield, Mass. In total, Monsanto estimates that it will be producing polystyrene at the rate of 80 million pounds per annum early in 1947.

The Texas City installation, adjoining the $9,550,000 monomer project, will utilize two large buildings used until 1933 as a sugar refinery, and which were purchased in 1942 by Monsanto. Styrene monomer will be piped directly from the styrene plant to the polystyrene manufacturing unit. The location is such that the finished material can be readily water-shipped to either eastern or western ports.

It is interesting to note that a few years ago polystyrene was a new plastic, with U. S. output considerably under a million pounds a month. But the tremendous expansion of styrene capacity in conjunction with the synthetic rubber program, has meant much to foster the development of this thermoplastic. Present indications are that U. S. output will move from its current 6 million pound per month output up to 12 million pounds next year, to be second only to the phenolics in poundage.

Major Expansion Plans Charted by Dow

Dow Chemical Co., Midland, Mich., has authorized expenditures of $40 million for the construction of new facilities within the next few years, according to its annual report to stockholders.

For the fiscal year ended May 31, 1946, sales totaled $101,813,839, some 18 per cent below the wartime peak of $124,570,000 in 1944-45, and approximately four times the prewar (1938-39) level of $26,762,000.

Overall sales for the year were broken down approximately at 50 percent heavy and industrial chemicals, 20 percent plastics and related compounds, 10 percent pharmaceuticals, 10 percent agricultural chemicals, and 10 percent magnesium and miscellaneous.

General Aniline Sales Shaded

General Aniline & Film Corporation's net sales were $31,794,000 in the first six months of 1946, compared with net sales of $38,702,000 in the first half of 1945, George W. Burpee, president, advised stockholders.

Net income was $2,482,000 or $3.38 a Common "A" share. This compares with $2,168,000 or $2.96 a share, for the like 1945 period. The reduction in sales reflects the change-over from war to peacetime production.

Cost of sales and expenses declined from $29,678,000 a year ago to $28,309,000 in the six months ended June 30, 1946. Provision for taxes for the first half of 1946 was $1,352,000 compared with $7,050,000 for the previous half-year. Reduced income, accelerated amortization of emergency facilities, etc., during the last half of 1945, resulted in a smaller tax accrual for the full year than the accrual stated above for the first six months.

Allied Chemical Expands Fellowship Plan

Allied Chemical & Dye Corporation, which has maintained graduate fellowships at a number of universities for some years, has extended its plan for the 1946-47 academic year by increasing both the stipend and the number of fellowships to be awarded. In all, 26 fellowships will be offered in 22 universities, carrying a stipend of $1200 plus tuition.

As in past years, nomination of the Fellows and the type of research work to be undertaken is left to the universities or colleges.

Calgon Names Gilmore To Research Post

B. H. Gilmore, formerly a research chemist with H. J. Heinz Co., Pittsburgh, has joined Calgon Inc. Dr. Gilmore will specialize in research and product development in the utilization of complex phosphates.

Du Pont Plans Third Nylon Unit

A third plant for manufacturing nylon yarn, to cost an estimated $20 million, is planned by E. I. du Pont de Nemours & Co., Inc. The new unit will be located on a 600 acre tract at Chattanooga, Tenn.

Application for construction has been made to the CPA and it is planned that the plant will be in operation within eighteen months.

The company's other nylon projects are at Seaford, Del.—which was completed in 1939—and at Martinsville, Va. The latter plant, which came into production late in 1941, is also being expanded.

Weyerhauser Pilot Plants Novel Adhesive

A phenol-formaldehyde molding and laminating compound, incorporating a

powdered wood-bark ingredient, is being made on a pilot plant scale by the Weyerhauser Timber Co., Longview, Wash.

The bark cork component, which is said to have thermoplastic properties of its own, is produced by Weyerhauser in an adjoining plant, whereas the resin is purchased from an outside source. Officials of the company say that they do not contemplate going into the manufacture of phenolic resins.

Most of the molding compound will be used as an adhesive by the new million dollar Weyerhauser plywood plant now in process of construction at Longview.

Diamond Alkali Completes Houston Plans

Diamond Alkali Company has selected Houston, Texas, as the site for its new industrial chemical plant, which will eventually serve the Gulf Southwest with chlorine, caustic soda, and hydrochloric acid.

Construction is now getting under way and it is expected that production of chlorine and caustic soda will begin in mid-1948. The Diamond property occupies approximately 250 acres—the plant itself to cover about 40 acres. Original investment will be approximately $6,000,000.00 and initial production will require about 200 employees.

Sodium chloride for the alkali-chlorine operation will be piped to the plant from a nearby salt dome. The unit will produce its own electricity, using natural gas as fuel.

Heyden Acquires Southern Phenol Unit

A Memphis, Tenn., phenol caustic soda-chlorine plant, leased during the war by Southern Acid and Sulphur Co., has been purchased by Heyden Chemical Corp., New York, for $1,060,000. This plant, never operated, was acquired by Heyden from War Assets Administration.

It is not anticipated that the unit will be functioning for several months, nor have detailed production plans been revealed. However, several interesting possibilities obtain, in view of the fact that Heyden is a large consumer of phenol, and producer of chlorinated hydrocarbons and formaldehyde.

General Electric Takes Over Hanford

Under an agreement with the government for research and development in the atomic energy field, the General Electric Company's Chemical Department has assumed responsibility for the operation of the $347 million, government-owned Hanford Engineering Works at Richland, Wash. Prior to September 1, these operations had been conducted by E. I. du Pont de Nemours & Co., Inc.

Zay Jeffries, vice-president and general manager of G. E.'s Chemical Department, has appointed William H. Milton, Jr., as administrator of the Hanford Works, with David H. Lauder as plant manager.

Mathieson Enters Fire Protection Field

The Mathieson Alkali Works has entered the fire protection field with both high and low pressure carbon dioxide equipment, it is announced by George W. Dolan, president of the company. Producer of heavy chemicals and chemical specialties, the company operates one of the largest carbon dioxide plants in the world at Saltville, Va.

Chas. T. Longaker, manager of Mathieson's carbon dioxide division, has named Harry Ensminger to head the fire protection department, with headquarters at the company's New York offices.

Pennsalt Buys Fluorspar Mine

The Pennsylvania Salt Manufacturing Company has purchased the Kentucky Babb Fluorspar mine near Salem, Kentucky.

The mine and surface inventory were bought from Roberts and Frazer, active in other fluorspar mining operations as the Kentucky Fluorspar Company. Pennsalt recently has completed underground explorations of the Kentucky Babb mine but is not now producing from it.

American Anode Promotes Lees

Robert A. Lees, named manager of the American Anode Inc. plant being constructed in Los Angeles. Mr. Lees, a chemical graduate of Oberlin College, joined American Anode in 1929 and has specialized in rubber latex research and production.

Montrose Plans Western DDT Plant

Plans have been completed by the Montrose Chemical Co., Newark, N. J., for the completion of a plant at Los Angeles to be devoted to the manufacture

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of technical DDT. The new affiliate will be known as Montrose Chemical Corp. of California, with initial production scheduled for early next spring.

P. Rothberg, president of the Newark organization, will also head the subsidiary, with S. Rotrosen assuming the post of secretary and treasurer.

Plan Expanded Silicone Production

General Electric Co. has recently purchased 28 acres of land adjacent to its silicone unit at Waterford, N. Y., to permit expansion of existing facilities.

At present the silicones are being manufactured in pilot plant quantities at Waterford, but it is anticipated that full scale operations will be realized, in the facilities now under construction, by January. A gradual reduction in prices is expected, as larger-scale output pares production costs, according to Harry K. Collins, manager of G. E.'s Resin and Insulation Materials Division.

Major Industries Formed On West Coast

A new company for the distribution of chemicals, Major Industries, has been formed in Los Angeles by W. E. Major, formerly manager of the chemical division of Union Oil Co. of California. Among others, the company is handling creosote and coal tar products from the Henry J. Kaiser Co. steel plant at Fontana, Calif.

Coincidentally with Mr. Major's leaving Union Oil, that company discontinued its chemical division as an individual unit. According to company officials, however, it will continue to make and market the majority of its chemical products, such as coke, waxes, solvents and insecticide carriers.

Staley Plans Glutamate Manufacture

Construction of a $1 million plant for the manufacture of monosodium glutamate at Decatur, Ill., is planned by A. E. Staley Manufacturing Co. It is anticipated that the new unit—designed to produce a million pounds of glutamate and other amino acid materials annually—will be in full scale operation late next year.

The project will be located adjacent to Staley's general-purpose pilot plant, on which work has been started, and the $2 million hexane extraction plant for soy bean processing, completed in 1945.

Rogers Chemicals Acquires Larger Quarters

Rogers Chemical Company of Dallas has recently purchased 1½ acres and four structures at 2615 Latimer Street in Dallas, for $50,000.

In the new location, the firm will have a two-story brick building for its office department and a steel warehouse. Two buildings will be served by individual spur tracks.

The company distributes chemicals, disinfectants, and insecticides throughout Texas and other Southwestern states.

Pabst Expands Research Program

In keeping with its plans to substantially expand its research activities, the Pabst Brewing Co., Milwaukee, is constructing a new, three-story, research building in that city. The research program will be under the direction of Alexander Frieden, who recently joined the Pabst organization.

The new building will house the research offices, a pilot plant, and the Theoretical and Applied Laboratories. In addition to the bacteriological, biochemical, physical chemical, organic, and chemical engineering divisions, a unit will be set up to engage in fundamental studies of flours and starches.

The Applied laboratories will work on the application of the company's present products, for use in the textile, paper, adhesive, and food industries.

Carbide Plans Major Texas Expansion

An expansion project approximating $4,100,000 has been approved by the Civilian Production Administration for the

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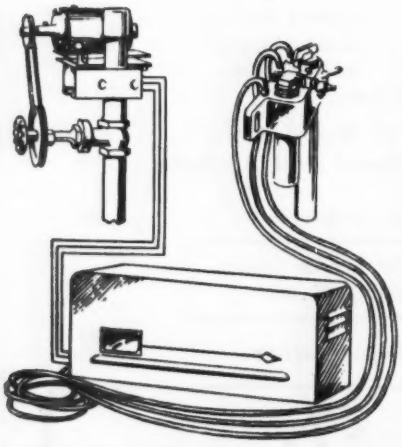

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Carbon and Carbide Chemicals Corp. at its Texas City plant.

This program is reported to be part of a $12,500,000 development planned for this Carbide unit which is a major producer of synthetic ethanol, acetic anhydride, isopropanol, acetone, and glycols.

ACS Honors Hudson

Claude S. Hudson, director of the Division of Chemistry at the National Institute of Health, Bethesda, Md., in whose honor a special symposium and banquet was held at the 110th national ACS meeting. Dr. Hudson has made substantial contributions in the field of carbohydrate chemistry.

Reichhold Reconverts Wartime Ester Plant

The reconversion of Reichhold Chemicals' wartime ester plant at Detroit, recent operation of which had been hampered by lack of vital raw materials, to the manufacture of a new type, low priced pure phenolic resin is now virtually completed.

Recent technical developments, put into practice during the reconversion, are responsible for more efficient operation of this plant, which has led to increased yields of resin from the same amounts of starting raw material. These greater yields have partially offset rising raw material costs, according to company officials.

Processing, in the reconverted plant, has likewise been speeded up and this, plus the increased yields, has more than doubled RCI's output of No. 2100 Super-Beckacite, the resin in question.

Vitamin A Expansion Planned in West

Collett, Week, Neibecker, large California manufacturer of vitamin A and D oils and concentrates, is planning consolidation of its West Coast operations in a new plant to be built within the next year on a six-acre plot adjoining its present plant at South San Francisco. The new facilities will include a new re-

search laboratory as well as increased plant capacity, according to Erling F. Week, president.

The present company was formed in April, 1946, by consolidation of Technical Fisheries Co. of San Francisco, suppliers of fish livers and raw fish liver oils since 1939, and Collett Corp. of Ossining, N. Y. The latter company was formed in 1942 as a subsidiary of E. & O. Collett & Co. of Oslo, Norway, pharmaceutical manufacturers, for supplying vitamin A and D concentrates to U. S. customers when the war cut off trade with Norway. This company erected a concentrate plant at Ossining, which also is to be added to as part of the expansion program.

The company's present West Coast operations which eventually will be moved to the new South San Francisco site are at Burlingame, Calif. (vitamin A and D poultry oil blending plant) and San Francisco (vitamin oil rendering plant). The present concentrate plant at South San Francisco will continue operation.

The company uses fish livers, mostly shark, as its raw material. These are digested and the oil separated centrifugally, or are solvent extracted to get the concentrate which because of removal of natural glycerides does not have the fishy odor of the oil. Production of vitamin A acetate has also been announced. This is a more stable product than the ordinary concentrates. The company's expansion program includes some new products which cannot yet be revealed, Mr. Week said.

Southern Research Institute Expands

With the completion of an additional group of laboratories, the Southern Research Institute has announced plans for extending its research services into the fields of applied biochemistry, pharmacology, toxicology, and industrial hygiene. The new facilities of the Biochemistry Division of the Institute are designed to assist producers and manufacturers of foods, drugs, and cosmetics in meeting the requirements of the Federal Security Agency, and aiding industry generally in the study of industrial and mining hazards arising from physiologically active fumes and aerosols.

Company Notes

FRITZSCHE BROTHERS, INC., New York essential oil house, recently celebrated the seventy-fifth anniversary of its founding. Coincidentally, the company has established an annual award of $500 and a gold medal to recognize important contributions toward new or improved methods in the testing of essential oils or aromatic chemicals.

GLENN L. MARTIN CO., which is constructing a $1.5 million plant for the production of vinyl resins, is considering

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doubling the size of the planned facilities. Rated capacity of the unit as designed was placed at 11 million pounds per annum.

DAVISON CHEMICAL CORPORATION, Baltimore, has purchased the mining properties of SOUTHERN PHOSPHATE CORPORATION, Bartow, Fla., and will continue to operate the organization under the corporate title of Phosphate Rock Division, Davison Chemical Corp. William H. Gabeler has been named manager of the Division, with headquarters in Baltimore.

Price Receives Pure Chemistry Award

Charles Coale Price, III, head of the chemistry department, University of Notre Dame, has been awarded the $1000 *ACS prize in Pure Chemistry for* 1946. *He was cited for his work in the mechanism of vinyl polymerization and aromatic substitution.*

NEWPORT INDUSTRIES INC. expects to open its new $200,000 research laboratories at Pensacola, Fla., within a few months, according to John H. McCormack, president. Separate divisions are being set up for customer research problems, with particular emphasis on protective coatings work. U. S. INDUSTRIAL CHEMICALS INC. is also undertaking a $200,000 expansion of its resin manufacturing facilities in the same city.

HANS RAHN & CO., Zurich, Switzerland, dealers in chemicals and pharmaceuticals, has opened a branch office in Antwerp under the name of Rahn Corporation. Mr. Rahn was engaged in the chemical business in Antwerp from 1922 to 1940, and founded the Zurich concern last year in partnership with Hans Deininger, Basle.

C. B. LYON & BRO., INC., St. Paul, Minn., has changed its name to LYON CHEMICALS, INC. Personnel and location remain unchanged.

CORNING GLASS WORKS, Corning, N. Y., plans construction of a pilot plant to facilitate the manufacture of new products. Covering 11,000 square feet of floor space the new unit will be equipped with one continuous furnace and additional fabricating machinery.

GAS ATMOSPHERES, INC., has been founded in Cleveland, Ohio, to specialize in the design, manufacture, and sale, of equipment to produce inert and active industrial gas atmospheres. The corporation has a number of patents on gas atmosphere equipment and processes, according to A. A. Straub, president.

TENNESSEE PRODUCTS CORP. has begun construction of a $25,000 research and pilot plant unit at its Chattanooga, Tenn., plant. According to Carl McFarlin, president, the new facilities will be used to further the corporation's research activities in the field of fine chemicals and wood distillation. Horace E. Hall will direct the program.

BAKER CASTOR OIL CO. has transferred its technical division, which embraces engineering, research and technical service departments, to 40 Avenue A, Bayonne, N. J.

HANDY & HARMAN, New York, has begun construction of a new plant in Los Angeles, Cal., according to G. H. Niemeyer, president. The company's offices will be moved to the plant location, 3625 Medford St., later this year.

HOOKER ELECTROCHEMICAL CO. has purchased the anhydrous aluminum chloride facilities it has been operating at Tacoma, Wash., for $25,000 from the War Assets Administration.

Among the companies leasing portions of the Basic Magnesium Corp. plant, Henderson, Nevada, are: HARDESTY CHEMICAL CO., STAUFFER CHEMICAL CO., and WESTERN ELECTRO-CHEMICAL CO.

Personnel Notes

RUDOLPH S. BLEY, chemical patent lawyer, has accepted a temporary appointment as scientific consultant with the Dept. of Commerce, technical industrial intelligence division. He will investigate Germany's synthetic fibre developments, while on leave from North American Rayon and Bember Corporations.

R. S. DEAN, formerly assistant director, Metallurgical Division, Bureau of Mines, has resigned from government service to become a professional consultant.

THOMAS W. NALE, formerly plant physician of the South Charleston works of Carbide and Carbon Chemicals Corporation, has been appointed assistant manager of the Industrial Toxicology Department of Union Carbide and Carbon Corporation, New York.

JOSEPH J. MATTIELLO, vice-president and technical director of the Hilo Varnish

Corporation, Brooklyn, N. Y., has been elected an honorary member of the Oil & Colour Chemists' Association of England, according to a cable recently received from the president of the organization, H. W. Keenan.

J. W. GREENE, formerly head of the department of chemical engineering, Kansas State College, has joined the University of Denver as chairman of its chemical engineering department.

ADRIEN VAN DEN BERG, a partner in Keyser & Mackay, Amsterdam, arrived in New York recently and will spend three months on a business trip in the U. S. A. and Canada.

JOHN A. SARGENT, formerly a colonel in the U. S. Army, has been named treasurer of Diamond Alkali Co., Pittsburgh.

L. A. PRATT, general sales manager of Monsanto Chemical Company's Merrimac Division, announces the appointment of F. FAXON OGDEN as manager of special products sales development and of J. J. MCCARTHY as manager of chemical sales development in charge of new products for the paper and leather industries.

NEWS *of* SUPPLIERS

Hewitt Rubber, Buffalo, division of Hewitt-Robins Inc., has announced the appointment of Monarch Rubber & Supply, Inc. as a new distributor of its industrial rubber products, Offices and warehouse of the new concern serving the San Francisco-Oakland areas are at 546 Howard Street.

Blaw-Knox Company has announced purchase from the May Properties Trust of a building and property located at 317-321 Penn Avenue, Pittsburgh. It is a reinforced concrete structure of five floors and basement with approximately 55,000 square feet of floor space and occupying a land space of 9,722.5 square feet, and when available, will be used to house the company's engineering departments. It is at present occupied by the War Assets Administration.

The continued expansion program of the **Rapids-Standard Company, Inc.** of Grand Rapids, Michigan, manufacturers of material handling equipment, has necessitated leasing of additional plant facilities to house the enlarged experimental and development department, according to Lloyd C. Backart, president and sales manager of the organization.

Moving of machinery and personnel to the new location was completed this month. The expanded department, to be known as Plant No. 3 Experimental, will have improved facilities together with precision tools for the designing, developing and testing of new products of Standard material handling equipment line.

St. Regis Sales Corporation, sales subsidiary of the St. Regis Paper Company, New York, has opened a branch office at 202 Farr Building, Allentown, Pa.

The company said the Allentown office, was opened to handle an increased volume of business in its multiwall paper bag division.

A new Hydraulics Division, to specialize in the development of hydraulic equipment, has been established by the **Rockwell Manufacturing Company,** Pittsburgh. W. H. Marsh will be general manager of the division.

E. W. Chapman has been appointed chief engineer of the newly created Industrial Pump Division of **Bowser, Inc.** with headquarters in Fort Wayne, Indiana, according to an announcement by J. B. Trotman, general manager of the division. Mr. Chapman was formerly chief engineer of the Blackmer Pump Company, Grand Rapids, Michigan.

Announcement is made by **American Car and Foundry Company** that R. S. Slater has been appointed manager of tank car sales. As such, he will be in charge of sales of tank cars, storage tanks and pressure vessels.

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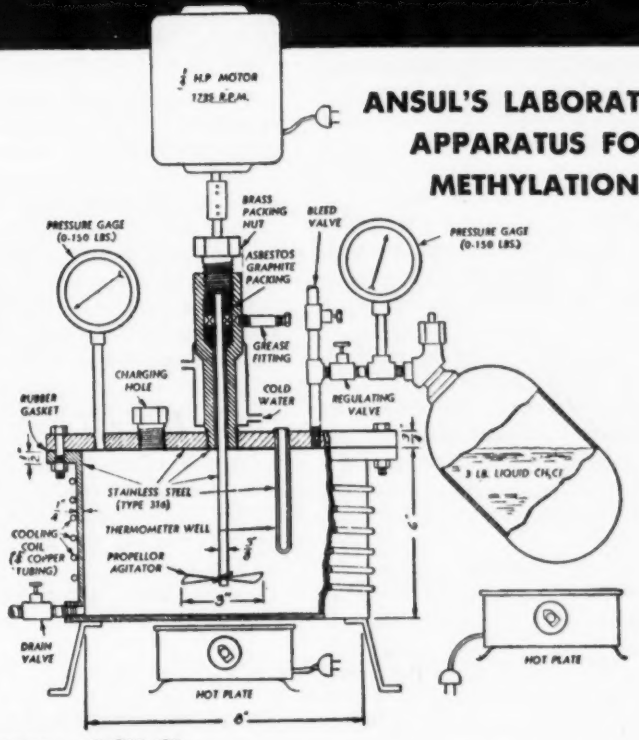

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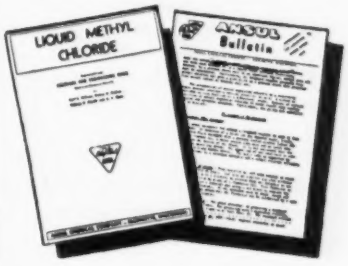

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CHEMICAL SPECIALTIES NEWS

Broader Field of Hormone Use Indicated

Plant hormones may find a new use in helping plants to withstand insect injury, according to observations made by E. H. Fisher, A. J. Riker, and T. C. Allen, of the University of Wisconsin.

It was noted that buds, blossoms, and small pods of canning string beans were blasting and dropping off because of attacks from insects, particularly Lygus bugs. Seeking to prevent this dropping the experimenters found it could be reduced enough to increase the bean yield 12-24 per cent by dusting with measured strengths of either alpha-naphthalene acetic acid or 2-4-dichlorophenoxyacetic acid.

It was apparent that the dropping was caused by the formation of abscission layers—a fact already familiar through the use of hormones against pre-harvest drop of apples. Utilizing illuminating gas as a means of producing such controlled abscission, a considerable number of hormones could be tested.

The hormone treatment caused the plants to yield a larger number of smaller beans—which although undesirable in some crops, is an advantage in this case. Too much hormone damaged the plants, and for some unknown reason only dust application was satisfactory—not sprays.

The experimenters made it plain that their work is only preliminary but suggestive of an interesting field of research.

Paisley Products Buys Adhesive Unit

Paisley Products, Inc., Chicago, has purchased the Adhesive Division of Certified Products Co., of the same city, according to Murray Stempel, vice-president. The purchase includes all formulas, manufacturing processes, raw materials and finished products. No processing equipment was included because Paisley plans to transfer all manufacturing to its own plant, now being expanded.

Paisley Products, Inc., founded in 1931, is a subsidiary of Morningstar, Nicol, Inc., New York, operators of Aroostook Potato Products, Inc.

Nuodex Extends Southern Activities

Nuodex Products Co., Inc., Elizabeth, N. J., has recently appointed George W. Gregg, as sales manager of its recently formed southern region with offices at 411 Bienville St., New Orleans.

Thompson Hayward Chemical Co., will continue as Nuodex agents in New Orleans and Mr. Gregg will be responsible for Nuodex activities among all agents in the new territory which includes North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Texas, Oklahoma, and Tennessee.

Du Pont Markets New Fungicide

A special fungicidal dusting compound to control foliage diseases of roses is being introduced by the Semesan Division of the Du Pont Company.

This Rose Dust is said to be especially effective against black spot, powdery mildew, and rust. It may be employed either as a dust or spray and is suitable also for carnations and snapdragons. Basic constituents are sulfur and ferric dimethyldithio-carbamate.

Zonite Extends Facilities

Zonite Products Corp., New Brunswick, N. J., has recently begun work on a $300,000 plant addition which is designed to increase productive capacity by some 50 per cent.

Walter Kidde Constructors, Inc., New York, are engineering the project.

Ceilings Removed on Polishes

Suspension from price control of shoe polish, floor polish, furniture polish, automobile polish, industrial wax finishes and dressings containing specified amounts of certain imported waxes has been announced by the Office of Price Administration.

Effective August 28, 1946, the suspension applies not only to these polishes and finishes but also to other products containing three per cent or more of one or more of the imported vegetable waxes, carnauba, ouricury or candelilla wax.

OPA explained that since suspension of the imported vegetable waxes, (carnauba, ouricury and candelilla), from price control on October 24, 1945, prices have more than doubled. As a result, manufacturers of products containing these waxes found it impossible to make the end products under their March 1942 ceiling prices. Many individual price increases were granted these manufacturers but they soon became inadequate.

Test 2,4D on Tropical Weeds

Although experimentation is still needed to establish fully the most effective uses of 2,4-dichlorophenoxyacetic acid (commonly known as 2,4-D) this growth regulating hormone is showing encouraging results in the control of tropical weeds.

Experiments carried on with 2,4-D at the Puerto Rican Experiment Station have been found particularly effective in killing such weeds as nutgrass, dayflower, caladium, water hyacinth, royal waterlily, and the lotus lily. Usually 1 to 2 parts of commercial 2,4-D to 1,000 parts of water is sufficient concentration for the kill.

Oronite Inaugurates Flotation Research

A program of research and development on flotation chemicals to facilitate the economical employment of low quality ores has been inaugurated by California Research Corp. for Oronite Chemical Co. Both companies are subsidiaries of Standard of California.

The program got under way recently with the establishment of a special flotation laboratory at California Research's installation at Richmond, Calif. In charge of the laboratory is William C. Bates, who

Novel Tractor Designed for Corn Borer Control

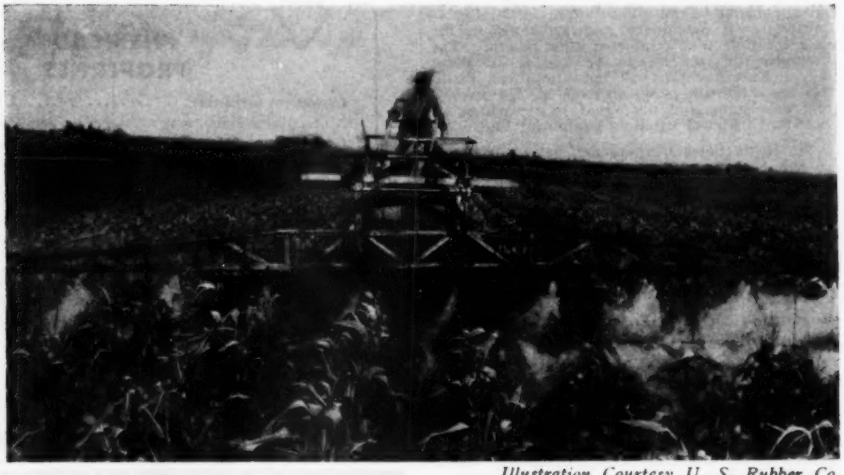

Illustration Courtesy U. S. Rubber Co.

Riding high over Midwest cornfields, a special tractor sprays DDT-containing insecticide in an effort to control the corn borer. The tractor, covering ten rows at one time, will spray 30 acres an hour.

has collected ore samples from all over the United States for use in the laboratory. Work will be done on both frothing agents and collectors.

Dow Chemical Co. is the only other manufacturer of flotation chemicals on the West Coast.

Johnson Joins Turco

Clark E. Johnson, recently released from the Navy, and formerly on the staff of the Science Department, Assuit College, Egypt, has joined the technical service department of Turco Products Co., Los Angeles.

U. S. I. Announces New Riboflavin Concentrates

Two new natural riboflavin concentrates have been announced by U. S. Industrial Chemicals, Inc., New York, to supplement its general line of livestock and poultry ingredients. These new concentrates, derived from a natural fermentation process, are now available for the fortification of animal feeds.

U. S. I. Riboflavin mixture No. 1 contains one gram of active riboflavin per ounce of material, and natural carriers containing vitamins of the B complex. Riboflavin concentrate No. 85 is a more concentrated product and consists of 85 parts per hundred of active riboflavin along with a natural carrier and an important number of the vitamin B complex.

Novel Cleaning Composition Patent

A cleaning composition, designed to remove oil, grease, and foreign matter generally from metals, is described in U. S. patent 2,386,789, issued to G. W. Gregg.

Its essential constituents are listed as:

	%
Solvent (2/3 ethylene dichloride, 1/3 propylene dichloride)	20.0
Soap (vegetable oil soap)	10.0
Penetrant (tar acid oil containing not less than 50% tar acid)	33.0
Coupling agent (butyl alcohol)	8.0
Antifoaming agent (denatured alcohol)	6.0
Preservative (finely powdered rosin)	1.0
Blending and thinning agent (sodium bichromate)	2.0
Water (sufficient to dissolve the soap)	20.0

The cleaner is said to require no special equipment, is not injurious to metals (including those subjected to anodic treatment), and may be used as a surface cleaner or immersion bath. The soap content is used for its detergent action, with a vegetable soap preferred because it dissolves more readily in cold water. The solvent breaks the bond between the metal and foreign matter, which settles out as a sludge.

Plough Extends Export Trade

Plough Inc., makers of Penetro products and St. Joseph aspirin, has recently opened a Pacific coast distribution office to serve seven western states and the Far East.

The company has resumed exports to the Hawaiian and Philippine Islands and is expanding its trade with Australia and China.

Stencil Ink Formula

A recently issued patent (U. S. 1,439,-356) covers the formulation of a stencil duplicating ink, composed of a one-to-one mixture of sulfonated oil and rosin oil (15 parts); a one-to-one green soap solution (1 part); pigment; and 1-3 per cent aluminum phosphate.

Anti-frothing Agents for Petroleum Products

The addition of from 0.2 to 0.8 per cent of potassium oleate (soap) to heavy oils, such as gear lubricants, serves to reduce or prevent frothing and foaming when the oil is subjected to violent agitation, according to H. G. Smith in U. S. Patent 2,377,654. Moreover, the soap does not impair the lubricating qualities of the oil. Thus, an improved gear lubricant may be prepared from:

Refined mineral lubricating oil	92.0 per cent
Refined sulfurized sperm oil	7.5 " "
Potassium oleate	0.5 " "

Calking Compound Formulation

A method of preparing a calking compound, described in U. S. patent 2,396,607 by T. H. Rogers, employs ordinary soap as a dispersing agent.

In essence, the method requires that a polyvinyl acetal be heated to a temperature of about 185° F, to which is added a mixture of casein and oleate soap.

By the subsequent addition of water, a dispersion is formed containing 45 to 70 per cent solids, with water as the continuous phase.

Searle Extends Facilities

G. S. Searle & Co., pharmaceutical manufacturer, Chicago, is constructing four new buildings in that city at a cost of $1,500,000.

The new structures will double the company's floor space.

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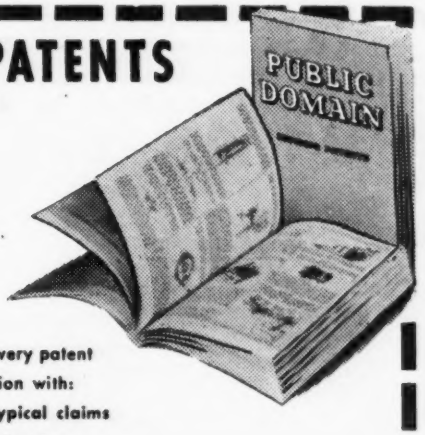

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CANADIAN NEWS

Strikes Pare Chemical Output

During the war the Canadian chemical industry was notably free from labor troubles, and actually won the Minister of Labor's commendation for its unique record in the nation's industries. But now, as labor collectively flexes its war-developed muscles, and strikes hit steel, rubber, electrical, automotive, and textile manufacturers, chemical producers, too, have encountered labor strife.

One of the first, and most serious strikes, was implemented at Canadian Industries, Ltd., Alkali Division, at Windsor, Ont. Some 530 employees struck, and apart from closing the Windsor facilities, also forced the curtailment of operations at the company's Cornwall and Shawinigan Falls caustic soda-chlorine units, dependent on Windsor for salt supplies.

Too, in mid-July, Brunner, Mond Canada, Ltd. (Solvay), the Dominion's major producer of soda ash and calcium chloride shut down its Amherstburg, Ont., operations when 400 employees walked out.

Already the shortage of alkalies is paring the operations of glass, sulphate pulp, aluminum, silicate, and other industries, and the odds are against an easing in the supply position for some little time to come. Hitherto, the Canadian market situation as far as alkalies are concerned had been much easier than that which exists in either the U. S. or England.

Synthetic Rubber Output at High Level

At the annual directors' meeting of Polymer Corporation, Limited, Canada's government-owned synthetic rubber plant, production figures for the fiscal year ending March 31, 1946, as well as the cumulative totals from the commencement of operations were disclosed. A total of 212,741 thousand pounds of Buna-S and Butyl were turned out from September 1943 to March 1946. Output of Buna-S in the fiscal year showed 79,310 thousand pounds of which 1,050 pounds were in latex form. Total for the entire production period was 179,475 thousand pounds.

Butyl rubber production provided a greater proportional increase with output in the fiscal year standing at 22,392 thousand pounds, compared with a cumulative total of 33,366 thousand pounds for the entire production period. Current output in the butyl rubber unit is 65 per cent above its rated capacity. It was further noted that whereas a year ago Polymer was turning out only one type of Buna-S, today four types are produced, plus three kinds of Buna-S latex. During the same period production of a new type of butyl was initiated. The corporation, whose plant extends over 185 acres, spent $865,166 for new facilities in the fiscal year and additional appropriations for such facilities were reported to be $991,772.

Current demand for Sarnia-made synthetic rubber is now at its highest peak, and although future demand may lessen, it is predicted that a substantial market will be maintained indefinitely. It is of interest to note that Britain's decision to stop the importation of synthetic rubber in favor of natural rubber will have no effect on Canada's synthetic rubber industry.

Burgeoning Standard Chemical

Not since the 1920's, when Canadian Industries, Ltd. (I. C. I.-du-Pont) was expanding rapidly, has any single chemical company, placing primary emphasis on domestic chemical production and sales, grown as rapidly as has been the case with Standard Chemical Co., Ltd., Toronto. Over the past two years its holdings have been substantially extended, and diversified. Its future course, and its probable place in the Dominion's chemical industry, are currently a matter of considerable speculation.

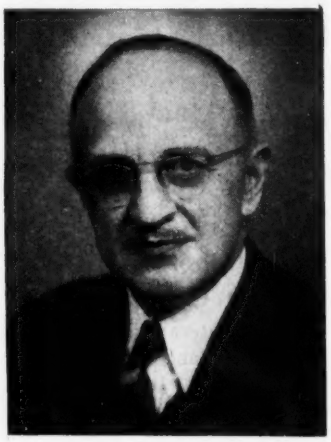
A few years ago, Standard Chemical—which is one of the oldest chemical concerns in the Dominion—was British-owned, and conservatively operated. Major activities were confined to the operation of several wood distillation plants, and the sale of ethanol produced by Commercial Alcohol Co., Ltd., Montreal. But when the English holdings were taken over by a group headed by Canadian financier E. P. Taylor, the company embarked upon a far-reaching expansion program.

One of the first moves was the purchase of Goderich Salt Co., Ltd., Goderich, Ont., third-ranking Canadian salt producer, for a reported $1 million. (Liquid assets of Goderich were said to be $500,000.) Thereafter, Malagash Salt Co., Ltd., was founded as another Standard subsidiary to mine salt in the Maritimes.

In addition, Standard acquired Schofield-Donald Co., Montreal, distributors of imported clays, pigments, magnesium salts, and subsequently Dalglish & Co., Ltd., Montreal and Toronto, a major manufacturer and maker of chlorine bleaches and special alkali cleaners. Too, a heavy block of stock in well-managed Dominion Tar & Chemical Co., Ltd.—salt and organic chemical producer—was purchased by the Taylor interests. In total, Standard's investments in other companies, in or associated with the chemical industry, were increased by $2,171,875 in the year ended March 31, 1946. Net profit gained 143 per cent, due largely, however, to the transfer of $125,000 from inventory reserve to operations. Profits for the current fiscal year are expected to show considerable improvement, but full return from the expansion program will not be realized until 1948.

It is an open secret that Standard plans the manufacture of a wider range of chemicals, and is actively engaged in surveying possibilities in broadening its chemical importation and distribution program. The nucleus has been formed; more than casual interest is being accorded the company's activities.

Carson Advanced to Vice-presidency



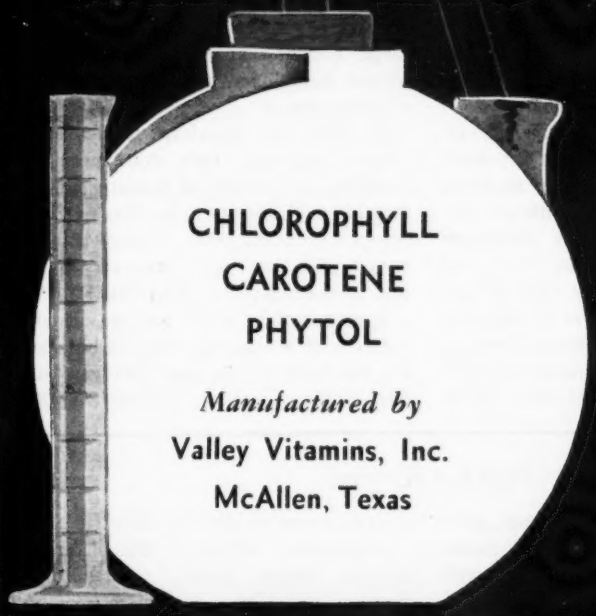
C. T. Carson, elected vice-president of Hiram Walker & Sons Ltd., Walkerville, Ont. Mr. Carson joined Hiram Walker in 1944 as production manager, prior to which he was chief chemist in charge of research for Frankfort Distilleries at the Maryland and Kentucky units.

Domestic Alum Unit Reduces Import Needs

One of the more significant of recent developments in Canadian chemical production has been the construction of the Dominion's first aluminum sulphate plant at Arvida, Quebec. For, prior to completion of this project, Canada was dependent upon imports—mainly from Great Britain—for its annual requirements of 40,000 tons of aluminum sulphate.

Rated capacity of the Arvida plant is placed at 35,000 tons per annum and is marketed in three grades—commercial, Alcan, and iron-free. Raw materials employed are aluminum hydrate and sulphuric acid. The former is made by Aluminum Co. by the Bayer process and the latter by the company's contact sulfuric unit. The batch-type process is utilized for sulphate production.

INDUSTRIAL AND PHARMACEUTICAL *Chemicals*



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MARKET OUTLOOK

Chemical Output To Approach Record

Fertilizer Output To Be Expanded

Little Easing of Fats And Oil Is Foreseen

Record Rubber Consumption Anticipated

Agricultural Insecticides Position Improves

Cornstarch Stringency To Abate

Market Review

Near Record Chemical Output Anticipated

Despite the production lost by the chemical industry, as a result of labor strife, raw material shortages, and other depressing factors, it is anticipated that total U. S. chemical production in 1946 will far exceed that of any previous peacetime year, according to the Department of Commerce. Present indications are that this year's output may be more than double that of 1939.

While the present capacity of the industry, including the facilities financed by the government, and now being converted to private operation, appear to be reasonably ample for future requirements of items previously produced, manufacturers of the newer chemicals are being delayed by a continuing shortage of contribution materials and equipment. Hence, the full impact of such projected expansion plans will not be felt in output figures for some time to come.

Nevertheless, tonnage, and dollar, values are expected to compare favorably even with 1945's $8.7 billion, which included four months of all time high production. Demand, likewise, will continue unabated for at least a year, and will probably be bolstered further by European orders when industry on the Continent has been rebuilt and is operating under more normal conditions.

Implement Program to Boost Fertilizer Output

In an effort to alleviate the foreign and domestic fertilizer shortages which are presenting a deterrent to world efforts to bolster food production, the government has initiated a three-pronged program to increase the output of basic fertilizer components — nitrogen, phosphorous, and potash.

The steps which are being taken to increase U. S. production include: reactivation of 17 Army ordnance ammonia plants to produce ammonium nitrate; action to make needed power equipment available to Florida phosphate mines, and the re-opening of the Army sulfuric acid plant at Tuscaloosa; efforts to spur resumption of potash exports from Germany.

Despite the implementation of this program it appears that demand will outstrip fertilizer supply for at least two years. For, even though an actual over-capacity of mixing facilities exists, a severe bottleneck obtains in basic productive facilities.

This extraordinary demand for fertilizers has been brought about as the result of two war-born developments. First, the production of Germany and Japan—large prewar exporters—is reduced to almost negligible quantities, except for German potash.

In addition, American farmers have greatly increased their consumption of fertilizer, as a result of government urging, and the higher crop incomes they have enjoyed in recent years. Actual domestic consumption last year was over 13 million tons, compared to 7.7 million in 1939.

Recent estimates of tonnage requirements with prospective supplies bracketed for the 1946-47 year are: nitrogen, 800,000(681,000); potash, 745,000(800,000);

Market Review

Heavy Chemicals—Even though production of most major industrial chemicals continues at record levels, demand still far outstrips supply, and present indications do not favor any real easing in the situation at least until early next year.

The market position in alkalies has been worsening steadily and carloads of caustic soda are virtually unobtainable. Bids up to a fancy 11 cents a pound have been received for odd lots, but have failed to uncover stocks. Sodium phosphates are also scarce, and occasional parcels of sodium bichromate have brought 17 cents—compared with manufacturers' 8 cents a pound schedule.

Curtailment of tanning activities, forced by the shortage of hides, has pared demand for sodium sulphide, but not to an extent where any relief appears on the horizon. One factor influencing this market is the apparently insatiable world-wide demand for sulphur dyes. Carbon tetrachloride rose 4 cents a gallon, under buying pressure, but sodium bicarbonate prices were shaded a dollar a ton by one dealer. Small lots of borax have been sold at a lush $155. No real improvement in this market can be anticipated for some months, for production is not able to keep up with the needs of ferro-enamel industries.

Copper sulfate stocks have been accumulating, as seasonal needs tapered, but export inquiries have taken up some of the slack. Bleaching powder manufacturers remain well sold ahead, with deliveries slowed by container shortages. Cresylic, coal tar, and creosote oil output is improving, with naphthalene orders piling up on producers' books. The crude grade, particularly, is moving in heavy tonnage to manufacturers of phthalic anhydride.

Isopropanol, methanol, ethanol, and acetone remain scarce, with little promise of easing. However, toluol, xylol and benzol output is now close to meeting consuming needs. On the other hand the phenol market has tightened sharply, and the odds are against a contra trend developing during this year.

Fine Chemicals — Reflecting the increase in the price of silver bullion, all silver salts moved upward during the month, with nitrate standing at 59 cents. Glycerin, propylene glycol, and glycerophosphates continued in short supply, and producers suggest that the glycerin shortage may well continue even though coconut oil allocations have been boosted.

Tartaric acid moved briskly, with replacements coming through with the better position existing in Italian tartar. Citric acid, likewise, although under steady demand, was readily obtainable, with some stock improvements recorded. Cod liver oil tightened as Norwegian exporters refused to accept orders on anything except a price-at-date-of-shipment basis, in anticipation of bolstered seasonal requirements.

In spite of recently reduced quotations, lanoline was inactive, as is normal at this time of year. Boric acid, on the other hand, commanded a neat $50 a ton in odd lots.

More than $2 million dollars of vanilla beans arrived from Madagascar and moved directly into consuming channels. Menthol and camphor remained steady, but mercury prices eased to a point dangerously close to U. S. shut down levels, as domestic producers concerned themselves with import quotations.

phosphoric acid, 1,850,000(1,525,000).

Greater domestic production of nitrogen and phosphorus is necessary both to meet the U. S. needs and to increase exports. In contrast, the potash stringency can be alleviated only by imports from Germany.

Little Relief in Fats And Oils Foreseen

Although prices of fats and oils continue at high levels no material increase in domestic production is in prospect for the next twelve months, in the opinion of the Department of Agriculture. Thus, in the light of an existing world-wide shortage of these commodities, consumers cannot count on the development of markedly improved conditions for some months.

In the first place, output of linseed oil from domestic flaxseed will be sharply diminished, because the current crop is expected to be down 40 per cent from last year. Too, uncertainties exist as to the quantities of flaxseed and linseed oil which will be imported from the Argentine during the next few months, for the total tonnage will be dependent on the outcome of negotiations between the Argentine government and a Committee representing the International Emergency Food Council, of which the U. S. is a member.

However, there is a possibility that some additions to U. S. supplies of fats and oils may result from changes in exports and imports during the next year, which will be determined largely by the effecting of international trade agreements.

In this respect, the Netherlands East Indies exportable surplus of copra has been made available to the U. S. through a contract signed by the Commodity Credit Corp. Thereby the U. S. will advance $15 million to the Dutch government, to be repaid in copra. Too, the Philippine government has agreed to sell its entire surplus of copra and coconut oil to Commodity Credit Corp. in a contract extending to next July.

Both arrangements will be contributory to an easing in the fats and oils stringency, but a normal supply-demand balance will not be attained for some time to come.

Record Rubber Consumption Predicted

Annual consumption of rubber in the U. S. will approach the million ton mark in 1946 for the first time in history, and correspondingly, producers of multifarious processing and compounding chemicals are anticipating the continuance of a peak level of demand.

During the first six months of this year rubber consumption reached a record 493,261 long tons, which is more than the total annual consumption for any one year prior to 1936. Moreover, this figure topped tonnage consumed for any comparable six month period even during the war years.

Consumption by type, during the first half of 1946, was: GR-S(styrene) 344,962 tons; GR-M(neoprene) 19,982 tons; GR-I(butyl) 41,406 tons, and N-type rubbers 2,389 tons.

Some Improvement in Agricultural Insecticides

Few chemical markets have been upset more than the agricultural insecticide division within the past few years, but, even though a number of major items still continue in short supply a few commodities now appear to be gravitating toward an easier position.

Notably, copper fungicide and rotenone markets have both improved, and for the first time in many months producers are optimistic. In the former case additional stocks of base metal have become available, and this factor, plus the easing of seasonal demand, has permitted manufacturers to make substantial additions to inventories. Supplies of copper sulfate, and carbonate, now appear to be adequate to meet anticipated domestic demand and more consideration is being accorded to export inquiries.

The better supply position in rotenone has resulted from the arrival of shipments of the roots, and even though release of these consignments was held up on New York wharves by labor troubles, they are now being processed. Production of finished insecticides will soon be realized, with initial output channelled to acute emergency areas. However, the longer term outlook has brightened and it is probable that next season's supply will be greater than any period since 1941.

On the other side of the ledger, calcium arsenate has moved into a more critical zone, as a result of the mounting demand for this material brought about by the threat of extensive boll weevil infestations in the South. Too, earlier strikes cut raw arsenic production by a full third, and unless the needs of southern cotton growers are less than usual a free arsenate market will not exist until next season.

Cornstarch Slated To Ease Slightly

With the completion of plans to channel supplies of corn to wet millers for processing, a slight improvement in the supply position of cornstarch—vital to the textile, paper, adhesive, and pharmaceutical industries—is in prospect.

Reports indicate that there is a supply of several million bushels of corn still held in storage, but whether this can be lured onto the market is a real question. However, it is felt that with indications pointing to the harvesting of a bumper crop of corn in November, the flow of stored grain may well be expedited. Thus some measure of relief can be anticipated soon, with a further improvement expected in the latter part of this year, in the opinion of government spokesmen.

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CHEMICAL ECONOMICS & STATISTICS

Barium Chemicals Output At Record High

New records were established in all important phases of the barite industry in 1945, according to the Bureau of Mines, United States Department of the Interior. Domestic production reached 692,330 short tons, 34 percent higher than the previous 1944 record. Consumption of domestic and imported barite was reported as 720,903 tons, 21 percent greater than during the prior high year, 1944. Arkansas and Missouri mills grinding for the Gulf well-drilling trade were mainly responsible for the unprecedented sales of ground barite, the national total being 468,939 short tons as against 344,757 for 1944, the previous record year.

The distribution of consumption of barite in the United States in 1945 was reported as follows (1944 in parentheses): Weighting oil-well drilling muds to prevent blowouts, 407,871 short tons (277,792); for barium chemical manufacture, 99,173 (100,921); for lithopone manufacture, 139,288 (134,597); as an ingredient of glass, 25,761 (24,153); as a filler in paint, 21,000 (23,000); as a rubber filler, 10,000 (10,000); and for other purposes, including grinding losses, 17,810 (25,100); total, 720,903 (595,563).

Baltimore Leads In Sulfuric

New sulfuric acid production for 1945 amounted to 8,687,070 tons, an increase of 147,693 tons over the previous year. The rise was largely in the Baltimore area where the production was 115,091 tons greater than in 1944. This area with nearly 877,000 tons of new sulfuric acid reported in 1945 advanced from third place in 1944 to first in 1945, replacing the New York area which is now the second largest producer. The Great Lakes area, the second most important in 1944, dropped to third place in 1945.

Statistics on sulfuric acid are compiled from data reported by 177 commercial sulfuric acid plants operating in the United States during 1945. As of December 1945, there were 174 reporting plants, 73 of these producing acid by the contact process and 101 by the chamber process. Fifteen plants reported production by both processes, thus accounting for the apparent duplication in the plant count. During the year three plants producing by the contact process discontinued operations.

Government-owned plants which are operated by private interests and which serve industrial users are included. However, plants owned by the government and operated in conjunction with ordnance works and arsenals are not covered.

Mining of Lithium Compounds Declines

During the war the utilization of lithium products reached record levels according to reports of producers to the Bureau of Mines, United States Department of the Interior. New plants and mines were opened to furnish large quantities of lithium compounds, such as lithium hydride—a source of hydrogen for inflating radio antenna balloons included in Navy rescue equipment. But when Government contracts were cancelled other markets of comparable size were not available. As the cutback came at the end of 1944, the effect was felt throughout 1945, and mine shipments of lithium minerals—spodumene, amblygonite, lepidolite, and dilithium sodium phosphate—declined 82 percent from the record of 13,319 tons set in 1944.

The spodumene mine operated by the Solvay Process Company at Kings Mountain, North Carolina, was idle after February, and the Black Hills Tin Co., Tinton, S. D., was inactive throughout 1945, but several other companies reported sales of spodumene, amblygonite, and lepidolite in South Dakota, and one mined lepidolite in Colorado.

Although production of all other lithium raw materials declined in 1945 the output of dilithium sodium phosphate increased. This compound is recovered as a flotation concentrate by the American Potash and Chemical Corporation at Searles Lake, California.

Tonnage and value of lithium ores and compounds shipped in recent years are shown in the following table.

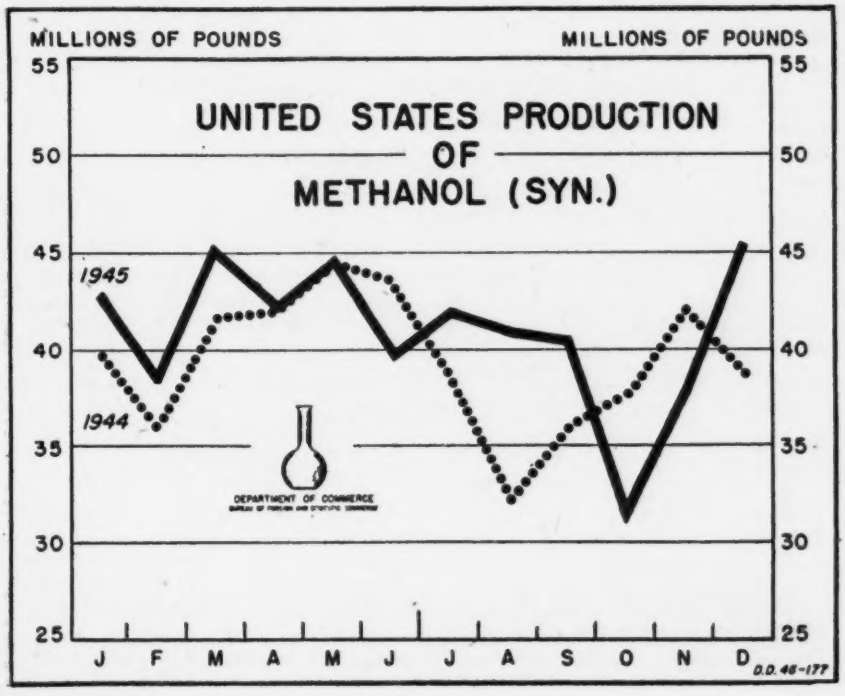
Year	*Ore (short tons)*	*Value*
1942	5,405	$243,516
1943	8,155	314,660
1944	13,319	552,977
1945	2,446	285,520

Lime Production Down in 1945

The lime industry in 1945 experienced a moderate decline compared with 1944, according to figures submitted by producers to the Bureau of Mines. Sales of "open-market" lime totaled 5,920,579 short tons—a decline of 9 percent from 1944 and 10 percent from the all-time high of 1943. The average price per ton increased 24 cents. Quicklime represented 77 percent and hydrated lime 23 percent of the total, whereas in 1944 the percentages were 80 and 20, respectively. Sales of agricultural lime declined 20 percent. The upward trend in the construction industries was reflected in a 6-percent gain in sales of building lime. The decline in production of war materials without a corresponding gain in peacetime manufacturing industries led to a 9-percent drop in sales of chemical and industrial lime and an 8-percent drop in sales of dead-burned dolomite.

The supply situation with respect to chemical and industrial lime continued to be somewhat critical throughout the year. Threatened shortages were due primarily to unavailability of labor.

In 1945 lime was produced at 189 plants in 36 States and 2 Territories. As stocks



of lime are small, the sales given in the accompanying tables are regarded as equivalent to production of "open-market" lime.

The net mill realization (excluding container cost) per ton of lime sold in the open market in 1945 averaged $7.76, a gain of 24 cents over 1944 and 49 cents over 1942. The gain in 1945 reflects the various upward price adjustments authorized by the OPA. As in 1944, the largest increase was in agricultural lime.

The use pattern of lime changes from year to year according to circumstances. Direct and indirect war uses have characterized recent years, and war was the principal controlling influence during most of 1945. A drift to peacetime uses was under way during the last quarter of the year, but reconversion had made too little progress by the end of the year to have any marked effect on the lime industry.

Fertilizer Exports Up—Imports Down

Export shipments of fertilizers and fertilizer materials totaled 109,000 short tons with a stated valuation of $2,380,000 in April 1946 and were more than double those shipped a year earlier. However, it should be remembered that the war was just coming to an end in Europe in April 1945, whereas, this April every effort was made to get shipments of vitally needed plant food to Europe and Asia to help in their spring plantings.

In each of the classifications, shipments were larger than last year with the exception of "other potash" and concentrated chemical fertilizers, the total of those two representing a very small amount of the aggregate. Shipments for Lend-lease amounting to 1,446 tons, valued at $57,618, and 22,796 tons valued at $681,445 shipped for UNRRA are included in the April figures.

For the first four months of the current calendar year the exports of fertilizers and fertilizer materials were two and one-third times larger than for the same four months a year earlier, with shipments of phosphate rock, superphosphate, and "other nitrogenous chemicals" accounting for a large part of the tonnage increase.

During the 10 months, July through April, 1,120,000 tons of fertilizer and fertilizer materials were shipped and were valued at $19,991,000, an increase over the same period a year ago of 84 and 79 per cent respectively.

The imports of fertilizers and fertilizer materials in April 1946, totaling 146,000 short tons and valued at $4,072,000, were just a little above those imported during April 1945 but were 25 per cent less than the imports two years ago.

For the first four months of this calendar year imports were considerably under those of a year ago with imports of sodium nitrate 168,000 tons less and imports of "all other phosphates" (chiefly

CHEMICALS

United States Production, June 1946

Statistics on the production of chemicals shown in the following table are a continuation of the series initiated with the report of February 7, 1944, in "Facts for Industry," Series 6-1-1 which covered the years 1941-1943. With the end of the war, the list of chemicals covered was reviewed and those presented here were selected for continuation. While considerably curtailed, this group of chemicals and gases is fairly representative of the products of the inorganic chemicals industry, and provides sufficient information for gaging the broad changes in operations from month to month. This list is subject to change if future developments indicate that additional chemicals should be covered or that certain of those on which data are now published have relatively small interest. The figures shown here represent the primary production of the various chemicals in the United States, including quantities produced for consumption in the producing plant, for intra-company transfer and for sale. Data on consumption and stocks in producing plants, included in this release through September 1945, are no longer collected.

Chemical and Basis	*Unit*	*Production*	
		June	*May*
Ammonia, synthetic anhydrous[1]	Short tons	[2]60,609	34,511
Ammonium nitrate, original (100% NH_4NO_3)	Short tons	[2]62,445	35,597
Ammonium sulfate, synthetic (technical)[3]	M pounds	13,238	17,054
Calcium arsenate (100% $Ca_3(AsO_4)_2$)	M pounds	4,116	*3,192
Calcium carbide (commercial)	Short tons	43,124	36,761
Calcium phosphate:			
Monobasic (100% $CaH_4(PO_4)_2$)	M pounds	5,233	4,867
Dibasic (100% $CaHPO_4$)	M pounds	5,670	4,143
Carbon dioxide:			
Liquid and gas	M pounds	16,774	16,979
Solid (dry ice)	M pounds	61,771	58,197
Chlorine[4]	Short tons	96,420	*89,947
Chrome green (C.P.)	M pounds	1,320	1,592
Chrome yellow and orange (C.P.)	M pounds	2,931	3,376
Hydrochloric acid (100% HCl)	Short tons	27,438	26,331
Hydrofluoric acid:			
Anhydrous (100% H_2F_2)	M pounds	3,334	3,443
Technical (100% H_2F_2)	M pounds		
Hydrogen	Millions of cubic feet	1,374	*1,202
Lead arsenate (acid and basic)	M pounds	5,091	*7,810
Methanol (natural) (100% CH_3OH)	M gallons	198	208
Molybdate chrome orange (C.P.)	M pounds	365	386
Nitric acid (100% HNO_3)	Short tons	[2]55,416	32,538
Oxygen	M cu. ft.	869,206	*836,052
Phosphoric acid:			
Total (50% H_3PO_4)	Short tons	68,706	*62,573
From phosphorus (50% H_3PO_4)	Short tons	33,740	32,706
From phosphate rock (50% H_3PO_4)	Short tons	34,966	*29,867
Silica gel:			
Desiccant grade	M pounds	5,164	3,016
Aviation gas catalyst grade	M pounds		
Silver nitrate (100% $AgNO_3$)	M ounces	3,851	3,712
Soda ash (commercial sodium carbonate):			
Ammonia soda process—			
Total wet and dry (98-100% Na_2CO_3)[5]	Short tons	308,623	303,174
Finished light (98-100% Na_2CO_3)[6]	Short tons	148,861	150,969
Finished dense (98-100% Na_2CO_3)	Short tons	107,615	104,055
Natural (Na_2CO_3 equivalent)[7]	Short tons	17,267	17,847
Sodium bicarbonate (refined) (100% $NaHCO_3$)	Short tons	13,355	14,399
Sodium bichromate and chromate	Short tons	6,285	7,096
Sodium hydroxide (caustic soda):[8]			
Electrolytic process—			
Liquid (100% NaOH)	Short tons	93,694	*87,226
Solid (100% NaOH)	Short tons	14,397	15,630
Lime-soda process—			
Liquid (100% NaOH)	Short tons	55,047	52,050
Solid (100% NaOH)	Short tons	14,043	14,740
Sodium phosphate:			
Monobasic (100% NaH_2PO_4)	Short tons	677	504
Dibasic (100% Na_2HPO_4)	Short tons	3,070	2,876
Tribasic (100% Na_3PO_4)	Short tons	5,960	6,087
Meta (100% $NaPO_3$)	Short tons	1,688	1,349
Tetra (100% $Na_4P_2O_7$)	Short tons	6,871	4,457
Sodium silicate:			
Soluble silicate glass, liquid and solid (anhydrous)	Short tons	34,912	29,198
Sodium sulfate:			
Anhydrous (refined) (100% Na_2SO_4)[9 10]	Short tons	8,645	*10,569
Glauber's salt (100% $Na_2SO_4.10H_2O$)[7]	Short tons	13,567	14,592
Salt cake (crude) (commercial)[7 9 11]	Short tons	44,184	*47,087
Sulfuric acid:			
Total (100% H_2SO_4)[12]	Short tons	733,241	780,702
Chamber process (100% H_2SO_4)	Short tons	[13]230,241	[13]267,845
Contact process (100% H_2SO_4)[14]	Short tons	[15]503,000	[15]512,857
Net, contact process (100% H_2SO_4)[14 16]	Short tons	[15]457,327	[15]472,693
Zinc yellow (zinc chromate) (C.P.)	Short tons	[17]	[17]

* Revised.

[1] Data for a small amount of aqua ammonia are included in the figures reported by one company.

[2] Includes operations of two establishments not previously reporting. Prior to June, production at these plants was classified as military and therefore not included here. See "Facts for Industry," Series 6-1-1.

[3] Excludes by-product coke oven production of ammonium sulfate which is published monthly by the Bureau of Mines.

[4] Represents total production of gas, including quantities liquefied for use, storage or shipment.

[5] Includes quantities diverted to manufacture of caustic soda and sodium bicarbonate and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1.

[6] Excludes quantities converted to finished dense soda ash.

[7] Collected in cooperation with Bureau of Mines.

[8] Liquid production figures represent total production for each process, including quantities later evaporated to solid caustic and reported as such.

[9] Revised. Revision occasioned by the reclassification of the reports of several producers of salt cake previously classified as producers of anhydrous material, and a similar reclassification of the report of one producer of anhydrous material previously classified as salt cake. See notes 10 and 11.

[10] Revised (in short tons): April, 10,985; March, 12,191; February, 9,320; January, 10,491; December, 9,489; November, 12,649; October, 11,741.

[11] Revised (in short tons): April, 46,060; March, 45,643; February, 40,505; January, 37,495; December, 44,604; November, 50,216; October, 47,781.

[12] Includes sulfuric acid of oleum grade. Beginning January 1946, includes estimates of by-product operations of eight smelters formerly reporting to the Bureau of Mines. See footnotes 13 and 15.

[13] Proportion of estimate, 7 percent.

[14] Includes sulfuric acid of oleum grade.

[15] Proportion of estimate, 2.5 percent or less.

[16] Excludes spent acid. For detailed explanation see "Facts for Industry," Series 6-1-1.

[17] Data cannot be published without disclosing operations of individual establishments.

(Source: Bureau of the Census)

crude rock), 95,000 tons less than a year ago. There were increases in imports of ammonium sulphate, calcium cyanamide and ammonium phosphate, among others, however, which helped to make the decline between the two periods smaller.

During the first 10 months of this fiscal year, July through April, imports totaled 1,069,000 tons and were valued at $30,608,000, decreases of 22 and 9 per cent respectively. In this 10-month period the pattern was much the same as for the first four months of this year in that large declines took place in sodium nitrate and "all other phosphates" but imports of most other materials were higher when compared with the same 10 months a year ago.

Sulfur Production Well Maintained

Production of native sulfur was well maintained during the second quarter of 1946, and output for the first half of the year was higher than any of the comparable six-month periods since this canvass began in 1940, according to the Bureau of Mines, United States Department of the Interior. Mine shipments dropped in May and June from the year's high established in April; stocks were but little changed.

Period		Production	Apparent sales*
March	1946	281,490	366,041
April	1946	284,473	370,226
May	1946	305,330	324,350
June	1946	304,472	316,909
March	1945	290,268	363,327
April	1945	292,229	331,744
May	1945	319,976	365,750
June	1945	309,570	370,916
First 6 mo.	1946	1,780,803	1,923,195
First 6 mo.	1945	1,748,442	2,072,024

* Calculated from production and change in stocks during the period.

Gypsum Industry Recovers From 1944 Low

Despite price difficulties and shortages of labor and materials the gypsum industry as a whole recovered in 1945 from the war-time low of 1944. Small increases were recorded for both mined and calcined gypsum, the generally accepted barometers of the industry.

Receipts of Canadian gypsum, for use in plaster and wallboard plants on the Atlantic seaboard and for peanut fertilizer in the Southeast, were the highest since 1941, although still much below pre-war levels. Sales of most gypsum building products showed increases, although sales of some low-profit items (including lath) and temporary structural materials (sheathing and laminated board) declined.

Radio Grade Quartz Output Pared

According to the Bureau of Mines, United States Department of the Interior, a period of great expansion in use of quartz crystal came to an end with the surrender of Japan. Although output of oscillators had tapered off somewhat dur-

PRODUCTION OF SYNTHETIC ORGANIC CHEMICALS

(Source: U. S. Tariff Commission)

Chemicals[1]	Unit of quantity	Production March 1946	Production April 1946
Acetanilid, tech. and U.S.P.	Pound	606,668	638,239
Acetic acid:			
Synthetic	Pound	25,008,262	23,187,005
Recovered	Pound	95,311,071	99,837,047
Natural[2]	Pound	1,738,155	2,342,315
Acetic anhydride[3]	Pound	44,026,772	44,789,682
Acetone	Pound	27,981,806	26,316,490
Acetylsalicylic acid	Pound	976,421	1,013,525
Aniline	Pound	7,607,352	6,624,185
Barbituric acid derivatives:[4]			
5-Ethyl-5-phenylbarbituric acid and salts (Phenobarbital)	Pound	34,105	35,684
5-Ethyl-5-(1-methylbutyl)-barbituric acid and salts (Pentobarbital)	Pound	7,865	2,497
Benzene: (Benzol)			
Motor grade:			
Tar distillers[5]	Gallon	971,183	896,596
Coke-oven operators[6]	Gallon	3,057,504	2,256,879
All other grades:			
Tar distillers[5]	Gallon	1,726,978	2,379,688
Coke-oven operators[6]	Gallon	10,303,242	8,739,032
Butyl alcohol, primary, normal	Pound	7,890,619	8,901,966
Carbon disulfide	Pound	24,224,250	21,909,280
Carbon tetrachloride	Pound	12,562,263	10,889,678
Chlorobenzene, mono	Pound	21,808,624	23,011,332
Creosote oil:			
Tar distillers[5]	Gallon	10,569,755	10,052,000
Coke-oven operators[6]	Gallon	2,725,111	2,386,273
Cresols:[7]			
Meta-para	Pound	405,555	748,565
Ortho-meta-para	Pound	705,560	491,292
Cresylic acid, refined[7 8]	Pound	2,465,361	2,266,946
Dibutyl phthalate	Pound	1,428,525	1,447,909
Dichlorodiphenyltrichloroethane (DDT)	Pound	3,380,369	4,139,852
Dyes (commercial concentrations):			
C.I. 202 Chrome blue black R	Pound	...	161,086
C.I. 581 Direct black EW	Pound	959,592	706,016
C.I. 1114 Anthraquinone vat blue BCS 20%	Pound	229,561	234,914
F.B. 302 Naphthol AS	Pound	122,959	72,508
Ethyl acetate (85 percent)	Pound	7,750,675	7,610,358
Ethyl ethers, tech. and U.S.P.	Pound	3,739,257	3,486,949
Formaldehyde (37 percent by weight)	Pound	41,822,668	40,256,656
Lakes: Peacock blue	Pound	266,775	308,625
Methanol:			
Natural[9]	Pound	1,313,126	1,229,449
Synthetic	Pound	46,419,578	43,932,508
Naphthalene:			
Tar distillers:[5]			
Crude, solidifying at—			
Less than 79° C.	Pound	15,108,529	17,660,149
Refined, solidifying at—			
79° C. and over	Pound	8,386,064	8,634,316
Coke-oven operators:[6]			
Crude, solidifying at—			
Less than 74° C.	Pound		
74° C. to less than 79° C.	Pound	7,104,529	5,389,912
Penicillin[4]	Million Oxford units	1,990,734	2,435,998
Phenol (synthetic and natural) tech. and U.S.P.[7]	Pound	16,968,899	18,438,959
Phthalic anhydride	Pound	9,776,815	9,216,851
Styrene (Government owned plants only)	Pound	30,870,809	31,778,855
Sulfa drugs:[4]			
Acetylsulfathiazole	Pound	...	...
Sulfanilamide	Pound	...	...
Sulfathiazole	Pound	243,545	201,390
All other	Pound	205,392	204,877
Tetramethylthiuram sulfides	Pound	...	...
Toluene:			
Coke-oven operators[6]	Gallon	1,782,474	1,465,272
All other[5 10]	Gallon	1,209,382	1,010,581
Vitamins:[4]			
Ascorbic acid and salts:			
Quantity	Pound	38,197	44,014
Value		$394,042	$508,905
Ergosterol, irradiated (Vitamin D_2):			
Quantity	Million U.S.P. units	2.557,276	3,566,932
Value		$138,277	$171,139
Niacin and niacinamide:			
Quantity	Pound	94,419	97,147
Value		$312,429	$322,408
Pyridoxine (B_6):			
Quantity	Pound	$36	931
Value		$243,592	$422,491
Riboflavin for human consumption:			
Quantity	Pound	...	...
Value		...	...
Thiamin chloride (B_1):			
Quantity	Pound	14,585	19,183
Value		$1,059,360	$1,393,360
All other vitamins:[11]			
Quantity	Pound	...	...
Value		$1,782,855	$2,506,714

[1] Reported on the basis of 100 percent content of the specified material unless otherwise indicated.
[2] Natural acetic acid produced by direct process from wood) and acetic acid distilled from calcium acetate as reported to the U. S. Bureau of the Census.
[3] Produced from ketene, acetylene, ethylene, and from acetic acid by the vapor phase process.
[4] Statistics are given in terms of bulk medicinals only.
[5] Produced by tar distillers from purchased coal tar only or from oil-gas or water-gas tar produced or purchased by tar distillers.
[6] Product of byproduct coke-oven operators only. These statistics are collected and compiled by the Coal Economics Division, U.S. Bureau of Mines.
[7] Statistics represent total production, from all sources including both data reported by coke-oven operators to the Coal Economics Division, Bureau of Mines and that reported by distillers of purchased coal tar to the U.S. Tariff Commission.
[8] Includes refined cresylic acid derived from petroleum.
[9] Reported to the U. S. Bureau of the Census.
[10] Includes toluene produced from petroleum by any process; does not include toluene produced under Ordnance control in petroleum refineries, but includes toluene produced from petroleum in plants not under such control.
[11] Includes panthothenic acid and salts, riboflavin for animal use, irradiated animal sterols, menadiones, and other vitamins for which statistics are not shown.

ing the first half of the year, the volume was large until military demand collapsed in August. Many companies went out of business or turned their attention to other products. A total of 113 companies were in production in 1944, but by the end of June, 1945, the number had declined to 96. Although considerable cutting equipment went out of production after the war, there still remains a large capacity available to supply the coming peacetime needs.

Much of the remaining stock of crystal was turned over to the contracting Government agencies, who in turn assigned it to the War Assets Administration as surplus material. Stocks of crude quartz held by the Metals Reserve Company were also declared surplus and were acquired by War Assets. The bulk of the radio grade material is being transferred to the stockpile of the Army and Navy Munitions Board.

Quartz crystal has been recognized by Congress as one of the strategic minerals that must be stockpiled for national defense. Small deposits are known to exist in the United States but they are so limited that our commercial supply comes almost entirely from foreign sources.

At present Brazil enjoys a virtual monopoly. Up to now quartz crystal has been mined and classified in Brazil and has been shipped in crude form to the consuming countries, where it is cut into oscillators, resonators and optical shapes. The war stimulated this trade tremendously. Communication, detection and control devices are more essential than ever before. As quartz crystal oscillators and resonators assure accurate frequency control for electrical circuits, they were used by the millions to equip the allied armies. The need was so great that when the submarine warfare was at its height crystals were flown from Brazil to the United States in planes.

PAINT, VARNISH, LACQUER, AND FILLER

Item	1946 June	1946 May	1945 June
Total sales reported by 680 establishments	$66,065,330	$72,462,915	$58,367,736
Classified sales reported by 580 establishments:			
Trade sales of paint, varnish and lacquer	$35,769,366	$40,659,079	$26,011,526
Industrial sales, total	$23,653,045	$24,474,818	$26,254,682
Paint and varnish	17,649,010	17,981,392	20,548,148
Lacquer	6,004,035	6,493,426	5,706,534
Unclassified sales reported by 100 establishments	$6,642,919	$7,329,018	$6,101,528

Lead Output—Consumption Out of Balance

Despite huge reductions in military requirements immediately following victory in both the European and Pacific phases of the war, the supply of lead available for industrial consumption throughout 1945 was seriously short of demand. Domestic mine production, the largest single source of supply, continued to decline. Imports of lead-bearing materials so urgently needed to offset the decreasing domestic mine output dropped to the lowest level since 1940.

Consumption of refined lead, although 12 per cent less than in 1944, continued at a high level and to meet demands for essential military and civilian use monthly allocations were made from Government stocks of refined lead.

The mine production of recoverable lead (including that made into pigments) from domestic mines in the United States and Alaska was 390,831 short tons, a decline of 6 per cent from 1944, and 21 per cent below the war-period peak in 1942.

Primary refineries in the United States in 1945 produced 462,110 short tons of refined lead, a decline of 3 per cent from the 1944 output. Of the 443,585 tons of primary lead produced in 1945, domestic ores and base bullion supplied 80 per cent, and 20 per cent was derived from foreign ores and imported base bullion, compared with 85 and 15 per cent, respectively, in 1944.

A survey of 570 plants in 1945 representing an estimated 90 per cent of the consumers of refined lead indicated a total consumption of 637,499 short tons of refined lead, a decrease of 12 per cent from 1944. Some secondary as well as primary refined lead is included in this figure.

Of the total consumed, 25 per cent was used to make red lead and litharge, 14 per cent for cable covering, 12 per cent for tetraethyl fluid, 9 per cent for storage batteries, 5 per cent for white lead, 5 per cent for sheet lead, 5 per cent for ammunition, and the remaining 25 per cent for a variety of products and uses. A distribution of the total consumed by related uses indicates 49 per cent consumed for metallic products, 30 percent for pigments, 13 per cent in chemical products, and 8 per cent in miscellaneous uses, such as annealing, galvanizing, lead plating, and weights and ballast.

Barite Mining Holds Steady

Output of primary barite in the United States amounted to 153,565 short tons in the first quarter of 1946, the Bureau of Mines states. Production was high seasonwise, but fell below the fourth quarter of 1945. The first quarter of each year generally shows a decrease in the rate of production compared with the rest of the year, owing to shut-down of eastern washers in freezing weather and to blocking of western operations by snow.

Although it is reported that a domestic firm has contracted to purchase 25,000 tons of Canadian barite, there were no receipts of Canadian ore in the first quarter of 1945, owing to ice conditions in the Bay of Fundy. Mexico shipped 114 short tons of crude barite valued at $646. There were no receipts of ground barite during the quarter. As the duty on ground material is $7.50 a long ton, it is generally imported only as a stop-gap measure to meet contract requirements

Bromine Sales Decline Sharply

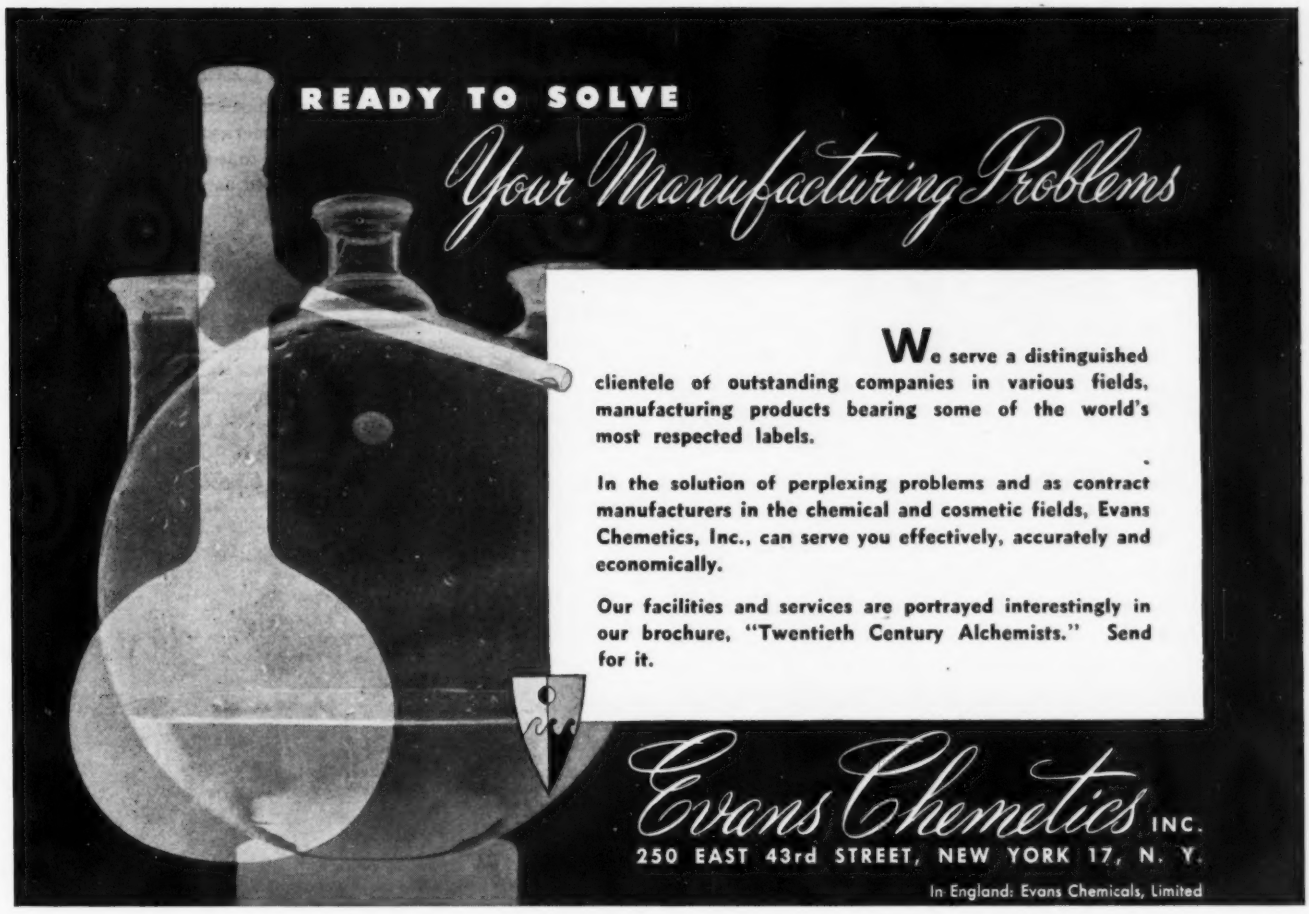
Sales of bromine compounds by primary producers in 1945 amounted to 79,709,857 pounds of contained bromine, a drop of 22 percent from the all-time high of 102,112,462 pounds produced in 1944, according to the Bureau of Mines. With the exception of a few percent used in photographic emulsions and laboratory reagents, almost all bromine produced in the United States is added to ethylene to produce ethylene dibromide, a complement required with the gasoline antiknock, tetraethyl lead.

SUPERPHOSPHATE

Production, Receipts, Disposition and Stocks, In short tons (2000 pounds)

Item	June 1946	May 1946	June 1945
Normal—18% APA			
Stocks on hand, beginning of month	407,020	429,916	673,015
Production	[1]565,670	*616,637	614,922
Received from other acidulators (inc. exchange transfers)	4,066	3,545	3,084
Book adjustments (account of inventory)	+4,995	*+4,319	−2,599
Total supply	[1]981,751	*1,054,417	1,288,422
Disposition, total	[1]458,261	*647,397	558,360
Shipments, total	252,696	*331,062	362,024
Used in reporting plants	205,565	*316,335	196,336
Stocks on hand, end of month	523,490	*407,020	730,062
Concentrated—45% APA			
Stocks on hand, beginning of month	42,465	36,940	23,460
Production	22,910	26,423	22,053
Received from other acidulators (inc. exchange transfers)	.....	.....	.....
Book adjustments (account of inventory)	.....	+1,373	−79
Total supply	65,375	64,736	45,434
Disposition, total	19,608	22,271	16,832
Shipments, total	19,341	22,065	16,743
Used in reporting plants	267	206	89
Stocks on hand, end of month	45,767	42,465	28,602
Wet-Base Goods—18% APA			
Stocks on hand, beginning of month	2,207	1,733	1,621
Production	1,756	5,231	1,019
Received from other acidulators (inc. exchange transfers)	.....	.....	.....
Book adjustments (account of inventory)	−3	+66	−2
Total supply	3,960	7,030	2,638
Disposition, total	1,699	4,823	266
Shipments, total	1,152	2,983	131
Used in reporting plants	547	1,840	135
Stocks on hand, end of month	2,261	2,207	2,372

* Revised.
[1] Proportion of estimate, 4.9 per cent or less.
(*Source: Bureau of the Census*)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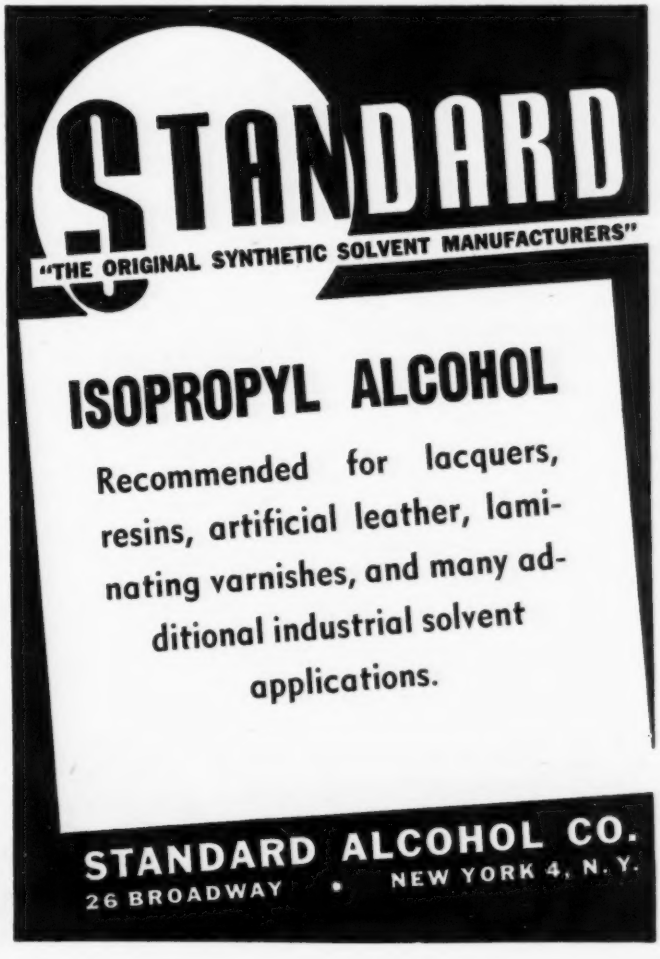
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The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
August, 1944, $0.884 *August, 1945, $0.870*
August, 1946, $0.759

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Acetaldehyde,99%,drs.wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. .....lb.	.06	.07	.06	.07	.06	.07
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. .....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks. .....100 lbs.	6.93	7.25	6.93	7.25	6.93	7.25
Acetylsalicylic, Standard USP .....lb.	.40	.54	.40	.54	.40	.54
Benzoic, tech. bbls. .....lb.	.43	.47	.43	.47	.43	.47
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	.54
Boric tech, bbls. c-l. ..tons *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls. .....lb. *b*	.20	.21	.20	.21	.20	.21
Cresylic 50%, 210-215° HB, drs. wks. frt. equal gal.	.81	.96	.81	.96	.81	.83
Formic, 85%-90% cbys. .lb.	.10	.11½	.10	.11½	.10	.11½
Hydrofluoric, 30% rubber, dms. .....lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs ...lb.	.25	.26	.25	.26	.25	.26
Muriatic 18° cbys ....100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° cbys, c-l, wks. ..100 lb.	...	1.75	....	1.75	...	1.75
22° cbys, c-l, wks. ..100 lb.	...	2.25	...	2.25	...	2.25
Nitric,36°,cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks .....lb.	.11¼	.12½	.11¼	.12½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP .....lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic tech, bbls .....lb.	.26	.42	.26	.42	.26	.42
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13.00
66°, tks, wks .....ton	...	16.50	...	16.50	...	16.50
Fuming 20% tks, wks. ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls ..... lb.	.62½	.63	.62½	.71	.70½	.71
Alcohol, Amyl (from Pentane) tks, delv ..... lb.	...	.131	...	.131	...	.131
Butyl, normal, syn, tks lb.	...	.10¾	...	.10¾	...	.10¾
Denatured, CD 14, c-l drs .....gal. *d*	...	.613	...	.613	...	.59
Denatured, SD, No. 1, tks.*d*	...	.542	...	.542	...	.52
Ethyl, 190 proof tks...gal.	...	17.65½	...	17.65½	...	17.60
Isobutyl, ref'd, drs ....lb.	...	.0660	...	.0660	...	.086
Isopropyl ref'd, 91%, dms .....gal.	.38	.41	.38	.41	.37½	.66½
Alum, ammonia, lump, bbls, wks .....100 lb.	...	4.25	...	4.25	...	4.25
Aluminum, 98-99% ...100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.09	.12	.08	.12
Hydrate, light, bgs. .... lb.	...	.14½	...	.14½	.14½	.15
Sulfate, com'l. bgs, wks, c-l .....100 lb.	1.15	1.20	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks .....100 lb.	1.75	2.00	1.75	2.00	1.75	2.10
Ammonia anhyd, cyl .....lb.	...	.14½	...	.14½	...	.14½
Ammonia, anhyd. fert. tank cars, wks. frt. equalized ton	...	59.00	...	59.00	...	59.00
Ammonium Carbonate, USP, lumps, dms ....lb.	.08¾	.09½	.08¾	.09½	.08¾	.09¾
Chloride,whi,bbls,wks,100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks. lb.	.0435	.0450	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls. lb.	...	.23	...	.23	.27	.33
Perchlorate, kgs .....lb.	no stocks		no stocks		no stocks	
Phosphate, dibasic tech. bgs .....lb.	.07	.07¾	.07	07¾	.07	.08½
Stearate, anhyd. dms....lb.		.34		34		.34
Sulfate, dms, bulk ....ton	28.20	30.00	28.20	30.00	28.20	29.20
Amyl Acetate (from pentane) tks., delv. .....lb.	...	.15½	...	.15½	...	.15½
Aniline, Oil, drs .....lb.	.12	.13	.11½	.13	.11½	.12½
Anthraquinone, sub, bbls...lb.	...	.70	...	.70		.70
Antimony Oxide, bgs ....lb.	.17	.17½	.15	.17½	.15	.16
Arsenic, whi, kgs—powd. lb.	.04	.04¾	.04	.04¾	.04	.04¾

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule, *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher.

		Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Barium Carbonate precip, wks, bgs.	ton	60.00	75.00	60.00	75.00	60.00	75.00
Chloride, tech, cyst, bgs, zone 1	ton	73.00	78.00	73.00	78.00	73.00	78.00
Barytes, floated, bbls.	ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms	lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd	gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys	lb.	.20	.21	.20	.24	.22	.24
Beta-Naphthol, tech, bbls, wks	lb.	.21	.23	.21	.24	.23	.24
Bismuth metal, ton lots	lb.	...	1.60	1.25	1.60	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks	ton h	40.00	40.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks,100 lb.		2.50	3.10	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs	ton i	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs	lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases	lb.	.21	.23	.21	.23	.21	.30
Butyl, acetate, norm. drs	lb.	.2314	.2364	.1860	.2364	17.90	19.45
Cadmium Metal	lb.	1.30	1.50	.90	1.50	.90	.95
Calcium, Acetate, bgs, 100 lb.		3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs	ton	50.00	90.00	50.00	90.00	50.00	95.00
Carbonate, c-l bgs	ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l	ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l,	ton	18.00	34.50	18.00	34.50	18.00	34.00
Cy'n'd, min. 21% N, c.l.	lb.	.02¼	.02¾	...	...	...	...
Gluconate, U.S.P., drs.	lb.	.57	.59	.57	.59	.57	.59
Phosphate, tri, bbls, cl.	lb.	...	.0635	...	.0635	...	.0635
Camphor, U.S.P., gran, powd, bbls	lb.	.69	.71	.69	.71	.69	.71
Carbon Bisulfide, 55-gal drs	lb.	.05	.05¼	.05	.05¼	.05	.05¼
Dioxide, cyl	lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms	gal.	.69	.73	.69	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more	lb.	...	.33	.24	.33	...	.24
Chlorine, cyls, lcl, wks, contract	lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract	lb. j	...	.05¼	...	.05¼	...	.05¼
Liq. tk, wks, contract 100 lb.		...	1.75	...	1.75	...	1.75
Chloroform, tech, drs	lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude	bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl	lb.	...	.83¼	...	.83¼	...	.83¼
Oxide, black kgs	lb.	...	1.84	...	1.84	...	1.84
Copper, metal	100 lb.	...	14.37	12.00	14.37	12.00	12.50
Carbonate, 52-54%, bbls.	lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks cryst.	100 lb.	5.00	5.65	5.00	5.65	5.00	5.50
Copperas, bulk, c-l, wks	ton		14.00	...	14.00	...	14.00
Cresol, USP, drs	lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
Dibutylamine, c-l, drs wks.	lb.		.66	...	.66	...	.66
Dibutylphthalate, drs	lb.	.2000	.2510	.1700	.2510	.1770	.2359
Diethylaniline, drs.	lb.		.40	...	.40	...	.40
Diethyleneglycol, drs, wks	lb.	.14	.15	.14	.15	.14	.15½
Dimethylaniline, dms,cl.,lcl	lb.	.21	.22	.21	.22	.23	.24
Dimethyl phthalate, drs	lb.	.20	.20½	.20	.20½	.20	.20½
Dinitrobenzene, bbls	lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms.	lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls	lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms	lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks.	lb.	.16	.20	.16	.20	.16	.20
Diphenylamine bbls	lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs	lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, tks, frt all'd	lb.	...	.1175	.0950	.1175	.0975	.1175
Chloride, drs	lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms	lb.	.0891	.0941	.0842	.0941	.0842	.0941
Glycol, dms, cl.	lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd.95-98% bulk, cl-mines	ton	...	37.00	...	37.00	...	37.00
Formaldehyde, bbls, cl & lcl	lb.	.0520	.0570	.0520	.0570	.0520	.0570
Furfural tech, dms, c-l,wks	lb.	...	.13	...	.13	...	.13
Fusel Oil, ref'd, dms, dlvd	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst, c-l, bgs, bbls, wks	100 lb.	1.05	1.45	1.05	1.45	1.05	1.45
Glycerine dynamite, dms, c-l,	lb.	.17½	.18¼	.17½	.18¼	...	.16½
Crude Saponification, 80% to refiners tks	lbs.	...	.11½	...	.11½	.09½	.11½

GUMS

Gum Arabic, amber sorts bgs	lb.	.14¼	.14¾	.11¾	.14¾	.11	.13
Benzoin, artificial, cns.	lb.	1.60	1.70	.52	1.70	.52	1.00
Copal, Congo	lb.	...	no stocks	...	.55¾	...	.55¾
Copal, East India, chips	lb.	...	no stocks	...	.55¾	...	.55¾
Macassar dust	lb.	...	no stocks	...	.07⅜	...	.07⅜
Copal Manila,		...	no stocks	.13½	.15½	.13½	.15½
Copal Pontianak, bold c-l	lb.	...	no stocks	...	.17⅜	...	.23⅜
Karaya, bbls, bxs, dms.	lb.	.21	.50	.18	.50	.15	.46

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

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METHYL "CELLOSOLVE"* STEARATE

METHYL "CELLOSOLVE" STEARATE, a synthetic ester, is used as a plasticizer for cellulose derivative, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula, $C_{17}H_{35}COOCH_2CH_2OCH_3$
Molecular weight 342
Color (platinum cobalt scale) 175
Melting point ..... 22° to 24°C
Flash point ..... 378°F
Acidity, less than .6 mg. KOH per gram ester
Specific gravity ..... .888 at 25°/25°C
Iodine value ..... 2 max.

Low volatility

* Trade mark of C&CCC

★

BUTYL STEARATE

BUTYL STEARATE, a synthetic ester, is used as a plasticizer for cellulose and polyvinyl derivatives, also for cosmetics, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula ..... $C_{17}H_{35}COOC_4H_9$
Molecular weight 341
Color (platinum cobalt scale) 130
Melting point ..... 19° to 20°C
Flash point ..... 358°F
Acidity, less than .6 mg. KOH per gram ester
Saponication number, 171-179 mg. KOH per gram ester
Specific gravity ..... .85-.86 at 20°/20°C
Iodine value ..... 2 max.

Low volatility

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Current Prices

Gums
Salt Lake

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Kauri, N. Y.						
Superior Pale XXX ... lb.	...	nom.	...	.65¾	...	.65¾
No. 3 ... lb.	...	nom.	...	.22	...	.23
Sandarac, bgs. ... lb.	.90	.95	.90	.99½	...	.99½
Tragacanth, No. 1, cases ... lb.	5.00	5.25	3.75	5.25	3.80	5.00
No. 3 ... lb.	3.20	3.45	2.10	3.45	2.15	3.00
Yacca, bgs ... lb.	...	nom.	.05	.07¼	.06	.07¼
Hydrogen Peroxide, cbys ... lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars ... lb.	1.75	1.85	1.75	1.85	1.75	2.10
Lead Acetate, cryst, bbls. ... lb.	...	.12½	...	.12½		.12½
Arsenate basic, bg, lcl ... lb.	...	.14½	.12	.14½	.11½	.12
Nitrate, bbls. ... lb.	...	.12½	...	.12½		.12½
Red, dry, 95% Pb_3O_4 bbls. ... lb.	.10¾	.12½	.09	.13¾	.09	.10¾
97% Pb_3O_4, bbls delv. ... lb.	.11¼	.12¾	.09½	.14¼	.09½	.11¼
98% Pb_3O_4, bbls delv. ... lb.	.11¼	.12¾	.08¼	.14¼	.08¼	.08¾
White, bbls ... lb.	.09¾	.10¼	.07¼	.11½	.07¼	.08
Basic sulfate, bbls, lcl ... lb.	.09	.09¼	.07¼	.10¼	.07¼	.08
Lime, Chem., wks, bulk ... ton	6.50	10.25	6.50	10.25	6.25	13.00
Hydrated, f.o.b. wks ... ton	8.50	12.00	8.50	12.00	8.50	16.00
Litharge, coml, delv. bbls. ... lb.	.09¾	.11½	.08	.15¼	.08	.09¾
Lithopone, ordi., bgs ... lb.	.0440	.0465	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks ... lb.	.07¼	.10¾	.07¼	.10¾	.06¼	.10¾
Chloride flake, bbls, wks c-l ... ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls. ... lb.	.14	.16	.14	.18	.15	.18
Dioxide, Caucasian bgs, lcl ... ton	74.75	79.75	74.75	79.75	74.00	79.75
Methanol, pure, nat, drs gal *l*	.63	.73	.63	.73	.63	.76
Synth, drs cl ... gal. *m*	.31	.38	.24	.38	.31	.38
Methyl Acetate, tech tks. ... lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv ... lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl ... lb.	.32	.36	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd ... lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks ... gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks tks ... lb.	.0275	.0325	.0275	.0325	...	.0275
Nickel Salt, bbls, NY ... lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk ... ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks ... lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls ... lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs ... lb.	.25	.27	.25	.27	.25	.27
Orthodichlorobenzene, drms ... lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks ... lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks, dms ... lb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl ... lb.	...	.12	...	.12	...	.12
Chlorophenol, drs ... lb.	.24	.27	.24	.27	.25	.32
Dichlorobenzene, wks ... lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks ... lb.	.21	.22	.21	.22	.21	.22
Nitroaniline, wks, kgs ... lb.	.41	.43	.41	.45	.43	.45
Nitrochlorobenzene, wks ... lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls ... lb.	...	.70	...	.70	...	.70
Toluidine, bbls, wks ... lb.	...	.48	...	.48	...	.48
Penicillin, ampules per 100,00 units ...	...	.48	.48	.95	.59	2.40
Pentaerythritol, tech ... lb.	.27	.31	.27	.31	.27	.33
PETROLEUM SOLVENTS AND DILUENTS						
Lacquer diluents, tks, East Coast ... gal.	...	.12	.11½	.12	...	.11
Naphtha, East tks, wks ... gal.	...	.11½	.11	.11½	...	.11
Rubber solvents, East, tks, wks ... gal.	...	.11½	.11	.11½	...	.11
Stoddard Solvents, East, tks, wks ... gal.	...	.10½	.10	.10½	...	.10
Phenol, U.S.P., drs ... lb.	.10½	.12½	.10½	.13	.10½	.11¼
Phthalic Anhydride, cl and lcl, wks ... lb.	.13	.14	.13	.14	.13	.14
Potash, Caustics, 88-92%, wks, sol. ... lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
Flake, 88-92% ... lb.	.07¼	.07½	.07	.07½	.07	.07½
liquid, 45% basis, tks ... lb.	...	.02⅞	...	.02⅞	...	.0275
dms, wks ... lb.	.03¼	.03½	.03	.03½	.03	.03½
Carbonate, hydrated 83-85% ... lb.	...	.05½	...	.05½	.05½	.05¾
Chlorate crys, kgs, wks ... lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs ... lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks ... lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans ... lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriatic dom, 60-62-63% K_2O bulk unit-ton ... ton	...	.53½		.53½	.53½	.56
Permanganate, USP, wks dms ... lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs ton	36.25	39.25	36.25	39.25	...	36.25
Propane, group 3, tks ... gal.	...	.03¾	...	.03¾	...	.03¾
Pyridine, ref., drms ... lb.	.45	.45½	.45	.45½	.45½	.46
R Salt, 250 lb bbls, wks ... lb.	...	.65	...	.65	...	.65
Resorcinol, tech, drms, wks ... lb.	.64	.74	.64	.74	.64	.75
Rochelle Salt, cryst ... lb.	.38½	.42	.38½	.47	.43½	.47
Salt Cake, dom, blk wks ... ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.
* Spot price is ½c higher.

		Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Saltpeter, grn, bbls.	100 lb.	8.20	9.00	8.20	9.00	8.20	8.60
Shellac, blchd. bone dry, bbls.	lb.	no prices		.42½	.71	.42½	.46
Silver Nitrate, 100 oz, bots 2,500-oz. lots	oz.	.58¼	.59	.47	.59	.47	.47¾
Soda Ash, 58% dense, bgs, c-l, wks	100 lb.		1.15		1.15		1.15
58% light, bgs cl.	100 lb.	1.05	1.18	1.05	1.18	1.05	1.13
Caustic, 76% flake drms, cl	100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms,cl	100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks	100 lb.	...	1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. dms	lb.	.08½	.10	.08½	.10	.08½	.10
Benzoate, USP dms	lb.	.46	.52	.46	.52	.46	.52
Bicarb, tech., bgs., cl., works	100 lb.	1.55	1.90	1.55	1.90	1.55	1.90
Bichromate, bgs,wks l.c.l.	lb.	.07⅞	.08½	.07⅞	.08½	.07½	.08⅛
Bisulfate powd, bbls, wks	100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks	100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l.	lb.	...	.06½	...	.06¼	...	.06¼
Cyanide, 96-98%, wks	lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks	lb.	.07¼	.08¼	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks	100 lb.	...	2.25	...	2.25	...	2.25
Metasilicate, gran, bbl, wks c-l	lb.	...	2.50		2.50	...	2.50
Nitrate, imp, bgs	ton	...	38.50	33.00	38.50	...	33.00
Nitrite, 96-98% bbl. cl.	lb.	...	.06¾	.	.06¾	...	.06¾
Phosphate, di anhyd. bgs. wks.	100 lb.	6.00	6.75	6.00	6.75	6.00	7.25
Tri-bgs, cryst, wks	100 lb.	2.70	3.10	2.70	3.10	2.70	3.45
Prussiate, yel, bbls. wks	lb.	...	.11	...	.11	...	.11
Silicate, 52°, drs, wks	100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l	100 lb.	...	.80	...	.80	...	.80
Silicofluoride, bbls NY	lb.	.06½	.07½	.06½	.10	.06½	.10
Sulfate tech, Anhyd, bgs	100 lb.	1.70	2.20	1.70	2.20	1.70	2.20
Sulfide, cryst c-l, bbls, wks	100 lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, wks	lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs	100 lb.	...	6.271	4.97	6.271	...	4.08
Potato, bgs, cl	lb.	.14	.14¼	.14	.18	...	.0637
Rice, bgs	lb.	no stocks		no stocks		no stocks	
Sweet Potato, bgs	lb.	no stocks		no stocks		no stocks	
Sulfur, crude, mines	ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs	lb.	.18	.30	.18	.30	.18	.30
Roll, bbls	100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl	lb.	.07	.08	.07	.08	.07	.09
tks, wks	lb.	...	.04	...	.04	...	.04
Talc, crude, c-l, NY	ton	...	13.00	...	13.00	...	13.00
Ref'd, c-l, NY	ton	13.00	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks.	lb.	no stocks		no stocks		no stocks	
Metal	lb.	...	.52		.52		.52
Toluol, drs, wks	gal.	...	.27	.27	.32	...	.33
tks, frt all'd	gal.	...	.22	.22	.27	...	.28
Tributyl Phosphate, dms lcl, frt all'd	lb.	...	.49	...	.49	..	.47
Trichloroethylene,dms,wks	lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks	lb.	...	.24	...	.24	...	.24
Triethylene glycol, dms.	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Triphenyl Phos, bbls	lb.	.31	.32	.26	.32	.26	.31
Urea, pure, cases	lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs	lb.	no stocks		no stocks		no stocks	
Bees, bleached, cakes	lb.	.68	.70	.60	.70	no-stocks	
Candelilla, bgs crude	lb.	.78	.80	.62	.80	.35	.36
Carnauba No. 1, yellow, bgs, ton	lb.	1.98	2.00	1.80	2.00	no stocks	
Xylol, Indus. frt all'd, tks, wks	gal.	...	.26	...	.26	...	.27
Zinc Chloride tech fused, wks	lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer, bgs, wks	lb.	.08½	.08¾	.07	.08¾	.07	.07½
Sulfate, crys, bgs.	100 lb.	3.40	4.15	3.40	4.15	3.40	4.15

OILS AND FATS

Babassu, tks, futures	lb.	...	.12	.11	.12		.111
Castor, No. 3, bbls	lb.	.	.18½	.13¾	.18½	.13¾	.14¼
China Wood, drs, spot NY	lb.	.39	.41	.39	.41	.39	.41
Coconut, edible, drs NY	lb.	...	.0985	...	.0985	...	.0985
Cod Newfoundland, dms.	gal.	.88	.90	.88	.90	.85	.90
Corn, crude, tks, wks	lb.		.12¾	.	.12¾	.	.12¾
Linseed, Raw, dms, c-l	lb.	.1680	nom.	.1680	.1770	...	.1550
Menhaden, tks		.1220	nom.	.1220	.1225	...	.1225
Light, pressed, drs l.c.l	lb.	.1300	nom.	.1300	.1620	...	.1300
Palm, Niger, dms	lb.	...	.0865	...	.0865	...	.0865
Peanut, crude, tks, f.o.b. wks	lb.	.12⅞	.13⅞	.12⅞	.13⅞	.12⅞	.13⅞
Perilla, crude dms, NY	lb.	no stocks		no stocks		no stocks	
Rapeseed, New Orleans, bulks	lb.	...	.13	...	.13	...	.156½
Red, dms	lb.	.13¼	.14¼	.13¼	.14¼	.12¼	.14¼
Soy Bean, crude, tks, wks	lb.	...	.15	.1175	.15	...	.1175
Tallow, acidless, bbls	lb.	...	.14¼	..	.14¼	...	.14¼

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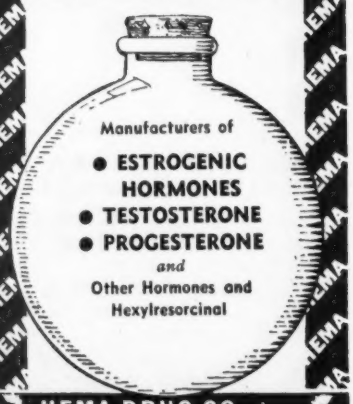

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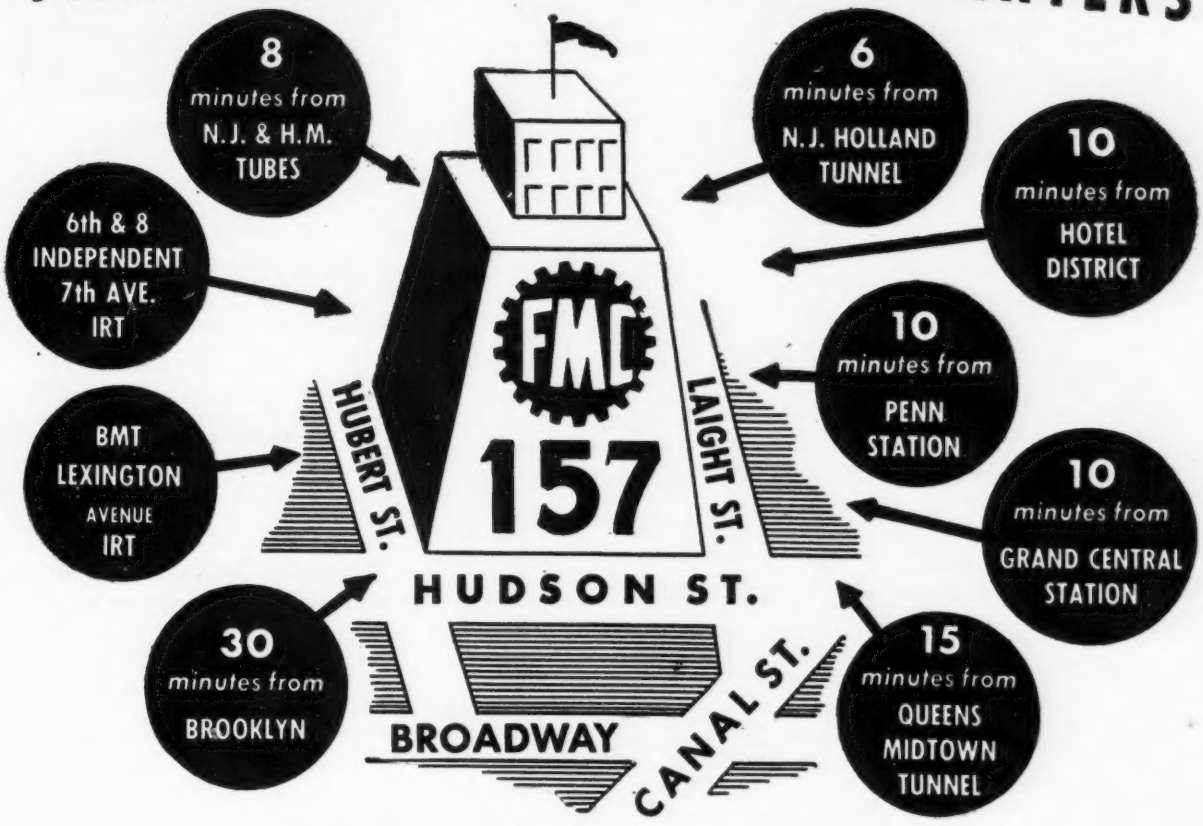

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Between the Lines

(*Continued from page 498*)

that at present no use is being made in this country, and relatively little throughout the world, of oil bearing shales, oil bearing sands or gravels. While deposits of this nature are large in this country, they are so located as to be distant from centers of liquid fuel consumption. Also the cost of extracting oil from them is higher than present petroleum production costs.

This report likewise explored the potentials in fuel products from low-grade coal and other materials. On this point, it is pertinent to summarize what W. C. Schroeder, chief of the Office of Synthetic Liquid Fuels, in the Bureau of Mines, reported to the Federal Power Commission.

Recalling the stupendous military demand at the peak of the war, Dr. Schroeder said that contrary to some expectations, petroleum demand is not slated to fall with the cessation of hostilities.

"It is now evident that to a considerable degree military demand is being replaced by increased civilian use and that by 1950 or shortly thereafter, our normal demand for petroleum products will exceed the maximum demand during the war years. This means that the country must be prepared to produce petroleum at a high rate for continuous peacetime periods."

After discussing problems of petroleum supply, including possible imports, he said:

"Engineering progress in this country and abroad in hydrocarbon technology makes it unnecessary to depend on petroleum and natural gas entirely as the sources of gasoline and oil, as well as the many by-products that we generally associate with the petroleum industry.

"Liquid fuels suitable for practically all uses can be produced from coal, lignite, oil shale, or agricultural products."

The main question, he said, involves relative costs, which is susceptible of important modification with engineering progress in the synthetic liquid fuels field.

Aside from the abundance of most grades of coal, he continued, the country has oil shale reserves sufficient to yield two to three times the quantities of oil in present known petroleum reserves. At the same time oil shale is not being used for any purpose. The establishment of such an industry, he said, would be beneficial in the areas in which the largest reserves are found. The Bureau during this summer was laying the groundwork for future oil shale extraction operations.

He recounted the Bureau's work in producing synthetic liquid fuels from coal, and referred to the Germans' handicap, discovered after the war by American technicians, resulting from their failure to satisfactorily solve the problem of removal of heat from the catalyst surfaces where the carbon monoxide and hydrogen reacted to form the oil.

"The Bureau of Mines and certain industrial organizations are making rapid strides in developing methods for removing this heat of reaction," Dr. Schroeder reported, "and as a consequence, units of equipment having a capacity of several thousand barrels a day are now possible."

In addition, Dr. Schroeder told the FPC hearings, progress has been made in the development of catalysts which will allow the production of gasoline of close to 75 octane rating, or the utilization of other catalysts to produce 100-octane gasoline from this source.

A Diesel fuel of 100-cetane, he said, may be especially useful to the Navy as a blending agent in Diesel engine use. Certain industrial organizations in this country, he continued, now etimate that with natural gas at 4 or 5 cents per 1,000 c.f., gasoline can be produced for about 6 or 8 cents per gallon. With further development of coal gasification processes, costs not much higher than this are possible, where coal can be obtained for around $1.00 per ton, with initial application of this process probably in fields where coal is obtainable from strip mine operations at low cost.

In conclusion, he added, by the end of the five-year program made possible by recent law (Public 290) it is believed the United States will have the basic information for production of oil from coal or oil shale on a commercial scale.

"It is also evident that, for certain of these processes, a sufficient improvement can be made to put them in the range where they may be nearly competitive with petroleum," he said.

Summarizing, and without exploring the major issue in the FPC investigation, as to jurisdiction of that or another agency, and the scope of such control, the collateral situation is that petroleum interests, given their head, believe there is enough petroleum; certain interests, and agencies in between, hesitate to see natural gas diverted to synthetic or other fuel manufacture; some witnesses dispute that there is enough petroleum, and the Bureau of Mines is preparing in any case for a petroleum shortage, if it comes.

Market Research Meeting Schedule

The Program Committee of the Chemical Market Research Association has announced the following schedule of meetings for the coming year:

October 31—Chicago—Palmer House—Subject: "Chemicals in the Food Industry"—Program Committeeman in Charge—J. M. Gillet.

December 12—New York City, Joint Symposium with Technical Service Group. Meeting place not yet selected. Special Meeting Chairman—J. H. Boyd, Jr.

February 6—Mount Royal Hotel—Montreal, Canada—Subject: To be selected. Program Committeeman in Charge—A. F. G. Cadenhead.

April 17—Hotel duPont, Wilmington, Delaware—Subject: "Sales Analysis"—Program Committeeman in Charge—R. M. Lawrence.

June 5—Annual business meeting—Hotel Biltmore, New York, New York.

Instrumentation Symposium Scheduled by AIChE

The New York section of the A.I.Ch.E. is planning a special meeting on October 17 at the Pennsylvania Hotel, New York.

Rather than the usual evening session, the program has been expanded to include an afternoon meeting featuring a symposium on instrumentation and process control problems and developments.

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FREEPORT

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"WE"– EDITORIALLY SPEAKING

THEY'LL HAVE to change the lyrics of that fine old missionary hymn, "From Greenland's Icy Mountains", if one recent prediction comes true. The ice cap might be melted by atomic energy, just as the Sahara might be made to blossom like a rose through the same panacean agency.

Even more perspicaecious is the observation that, unless workable international controls are forthwith enacted, atomic warfare might ensue, which, the speaker said, in all probability would end world trade for a long, long time.

PENICILLIN cures lots of things, including (temporarily, at least) the Chinese financial situation. We understand that it was used, as well as other commodities, as currency during the earlier stages of the present inflation. As it became more plentiful, however, the market broke, and that was *that*. In some of the larger business deals, caustic soda, too, was used as a medium of exchange.

This new crystalline penicillin ought to be just the stuff to play money with. Your dollars wouldn't become worthless in the hot Hongkong sun.

REMEMBER that company we told you about last month that sent us half a dozen forms ordering a booklet? Since then we've received a cancellation: an amended purchase order (one copy), an invoice (four copies), and something quite undecipherable even to our red-tape expert (two copies).

Now we know how Wallace's 1950 goal of 60,000,000 jobs has already been attained!

DR. COHOE had something pertinent to say in his Messel Memorial Lecture, delivered recently in London:

"The dramatic and terrifying demonstrations of "atomic energy" have found human nature bewildered and unable to comprehend either the present situation or future implications. Again the cry has gone up to 'stop science' and the clamor there may be likened to the 'braying of wild asses upon the mountains'. These proponents fail to realize that there exists no human agency with the power either to retard greatly, much less to stop, science. Science should and must never become a cancerous growth in the body politic. To the contrary, it asks for nothing better than to be allowed to serve humanity."

WE STILL HAVE the capacity to be amazed. Ever hear of diisopropyl fluorophosphate? It's a new war gas which acts on the nervous system. It was tested by exposing electric eels, of all things animal and vegetable, to its lethal vapors. The eels were flown to the lion house at the Bronx Zoo and fattened up for the test. They are especially electric, we understand, because they abound in choline estrase, an enzyme which is responsible for the nerve impulses in higher animals, including the highest—man.

WE HAVE LONG HELD to the philosophy that the shoemaker should stick to his last; i.e., ditchdiggers are probably not valid authorities in dramatic criticism nor scientists hot stuff at international diplomacy. We find ourselves also siding with Thomas Manning, who feels that poets should not encroach upon the province of the chemist, as we learn from the December 30, 1817, entry in Henry Crabb Robinson's diary: "[Samuel Taylor] Coleridge was philosophizing in his rambling way to Monkhouse, who listened attentively—to Manning, who sometimes smiled, as if he thought Coleridge had no right to metaphysicize on chemistry without any knowledge of the subject. . . ."

FOR A LONG TIME we (being a chemist) have suspected that engineers are either morons or monsters. Our dark suspicions are borne out by "The 1946 Survey of the Engineering Profession", put out by the U. S. Department of Labor. Question 2 reads:

SEX: Male....1 Female....2

and then adds, for the enlightenment of our benighted brethren: (*Circle one and only one of these two code numbers*).

IT HASN'T COME to our attention that the recent ACS meeting had any sessions quite as spectacular as that of the Royal Society, of which we were just reading, where Krafft scattered bits of the newly-discovered phosphorus on the floor, "these twinkling sparks, without doing any harm (*that we took notice of*) to the Turky Carpet they lay on, continued to shine for a good while."

FIFTEEN YEARS AGO

(From Our Files of September, 1931)

Warren N. Watson, secretary of the Manufacturing Chemist's Association, and Harry M. Mabey, general traffic manager, Mathieson Alkali, testify in opposition to the granting of a horizontal 15 per cent increase in freight rates at Interstate Commerce Commission hearings.

Solvay Process Co. marks the 50th anniversary of its incorporation. It is the largest manufacturer of commercial alkali in this country.

Chemical executives on President Hoover's Unemployment Committee include Pierre S. du Pont, chairman of the board, du Pont de Nemours; George Eastman, holding similar position in Eastman Kodak; Col. William C. Procter, Procter & Gamble; and Walter Teagle, Standard Oil of New Jersey.

Zinc producers meeting in Paris declares a new cartel effective as of August 1. Members of the cartel have a combined production capacity of 1,123,000 metric tons of zinc a year. This represents 97% of the European and overseas capacity of the world, exclusive of the U. S.

Progress in the perfecting and use of hydrogenation processes is announced by the I. G. The company officially makes known that the gasoline producing capacity of the Leuna plant has been increased from 100,000 to 350,000 tons per annum. This is accomplished through a new catalyzer process and involves no material increase in plant.

Frank J. Tone is selected as the first winner of the Jacob F. Schoellkopf Gold Medal.

THIRTY YEARS AGO

(From Our Files of September, 1916)

Bayer & Co. announces that it will commence action against concerns making acetyl salicylic acid (aspirin).

Congress enacts a tariff for the protection of the coal-tar products industry.

Fifty-third convention of the A. C. S. is held in New York City, Sept. 25 to 30 in conjunction with the second Chemical Exposition.

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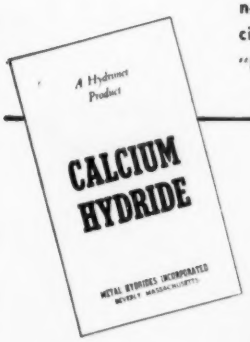

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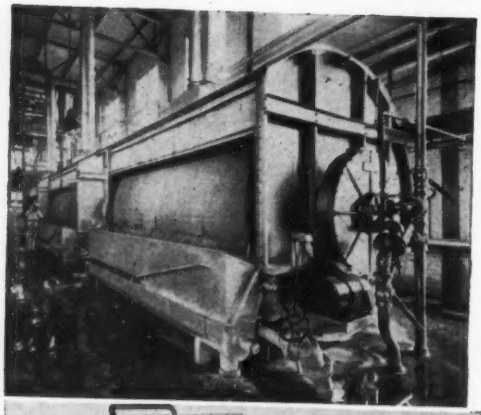

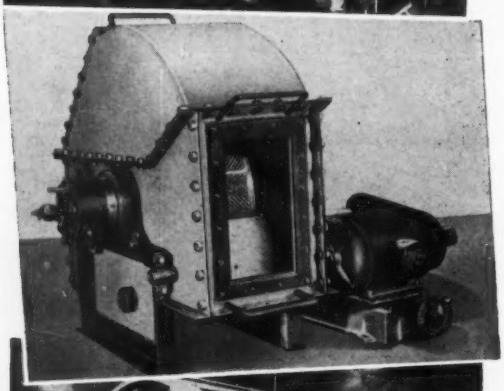

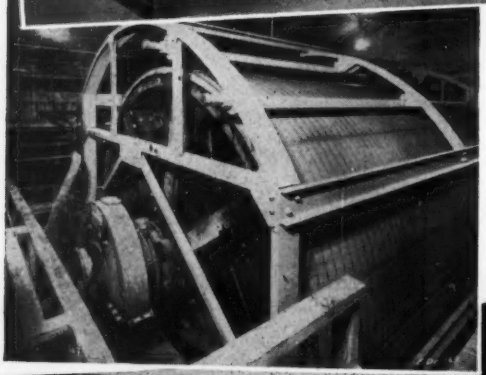

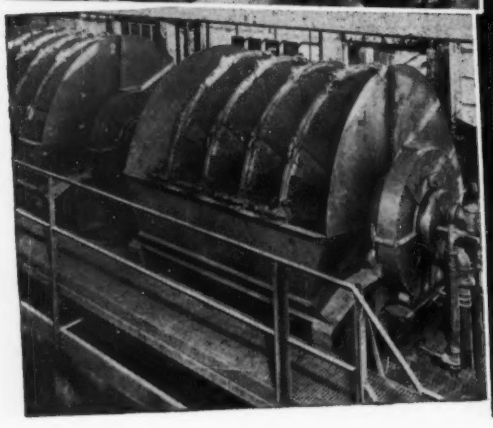

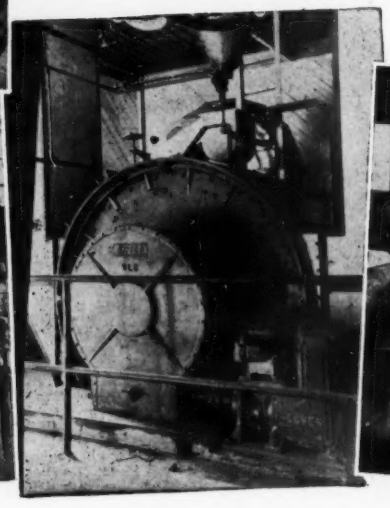

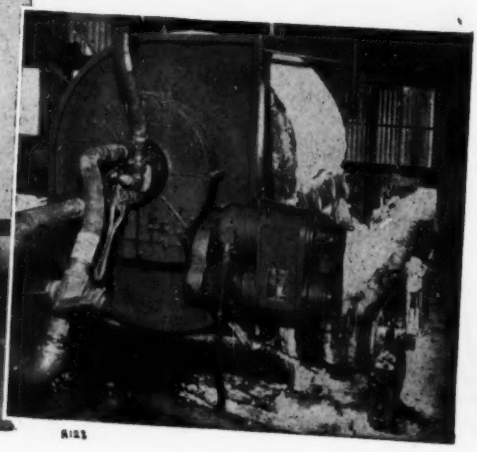

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PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 586, Nos. 2, 3, 4—Vol. 587, No. 1 (May 14-June 4)—p. 703

* *Organic*

Aralkylated sulphamides and process of making same. No. 2,398,990. Otto Albrecht to Society of Chemical Industry in Basle.

Obtaining 1,-2-dichloro-1,1-difluoroethane which comprises heating mixture consisting of trichloroethylene and hydrogen fluoride. No. 2,399,024. Jesse Harmon to E. I. du Pont de Nemours & Co.

Amides of 2-aminoarylenethiazoles. No. 2,399,026. Ernst Henzi to Society of Chemical Industry in Basle.

Producing 1,3-butadiene by dehydration of 1,3-butylene glycol. No. 2,399,049. Thomas Manninen to U. S. Industrial Chemicals, Inc.

Heat resinifying furfuryl alcohol in presence of chlorinated tricresyl phosphate containing chlorinated methyl groups as resinification catalyst. No. 2,399,055. Birger Nordlander to General Electric Co.

System for producing acetylene. No. 2,399,058. Peter Peff.

Unsaturated 5-amino-1,3-dioxanes and preparation thereof. No. 2,399,068. Murray Senkus to Commercial Solvents Corp.

3-(2-hydroxyethyl)-2-oxazolidone. No. 2,399,118. August Homeyer to Mallinckrodt Chemical Works.

Producing ethers by intertaction between olefins and alcohols which comprises contacting olefin with alcohol in presence of catalyst consisting of hydrofluoric acid and boron fluoride. No. 2,399,126. Arthur Lien to Standard Oil Co.

* *Paper and Pulp*

Sizing composition for paper making, in aqueous suspension and comprising binding agent selected from fusible resins and waxes, clay in fine particles, a compatible soap and casein cut with alkaline cutting agent. No. 2,399,748. Andrew Luettgen to P. H. Glatfelter Co.

Increasing wet strength of paper while preserving dry tear resistance thereof which comprises impregnating paper with solution of sodium silicate, impregnating paper with solution of acidic material to convert sodium silicate absorbed by paper into silicic acid, and heating paper to dry it and to convert silicic acid into silica. No. 2,399,981. Kenneth Britt to Scott Paper Co.

Increasing wet strength of paper while preserving dry tear resistance, which comprises impregnating paper with solution of sodium silicate and heating paper above 212° F. to deposit sodium silicate reducing tendency of paper fibres to swell upon application of water. No. 2,399,982. Kenneth Britt to Scott Paper Co.

Filling and bleaching paper making stock which consists in forming acid hydrosulphite solution of calcium and zinc by treating calcium bisulphite solution containing free sulphur dioxide with metallic zinc, neutralizing by addition of milk of lime, adding suspension of white precipitate in acid solution of hydrosulphite to paper making stock and effecting bleaching and loading of said stock. No. 2,398,420. Horace Freeman to Consolidated Paper Corp. Ltd.

Apparatus for coating paper comprising pair of rolls, metering roll cooperable with descending side of upper of rolls. No. 2,398,843. Gerald Muggleton and Albert Piepenberg to Combined Locks Paper Co.

Coating paper which consists in applying measured film of aqueous suspension of solids on surface of one of pair of rolls. No. 2,398,844. Gerald Muggleton and Albert Piepenberg to Combined Locks Paper Co.

* *Petroleum*

Isomerizing paraffin hydrocarbons of pentane-hexane boiling range. No. 2,399,765. Bernard Shoemaker and Bernard Evering to Standard Oil Co.

Increasing aromatic content of straight run naphthas free from C_4 and lighter hydrocarbons and boiling below about 500° F. No. 2,399,805. Paul Hurley and John Dunlap to Shell Development Co.

Isomerizing straight chain paraffins of at least four carbon atoms per molecule in presence of Friedel-Crafts type catalyst and halogen-halide promoter to produce branched chain paraffins, wherein feed stock is pretreated with conc. mineral sulfur-oxygen acid to remove impurities therefrom, improvement comprising contacting acid-treated feed stock with porous alumina prior to isomerizing. No. 2,399,883. Norval Myers to Standard Oil Development Co.

Treating hydrocarbon fraction including C_4 paraffin and C_4 mono-olefin comprising bringing fraction into contact with catalyst which comprises 80% MgO, 14% Fe_2O_3, 3% K_2O and 3% CuO, to cause isomerization of C_4 mono-olefin and formation of C_4 diolefin. No. 2,399,895. Wilson Seyfried and Sam Hastings to Standard Oil Development Co.

Catalytic conversion of normal hydrocarbons having five carbon atoms in molecule, for production of isoparaffins of lower molecular weight, comprising contacting normal hydrocarbon feedstock with catalyst consisting of compound selected from oxides and sulphides of metals of group VI of periodic table. No. 2,399,927. Donald Howes and Eric Fawcett to Anglo-Iranian Oil Co. Ltd.

Reducing water loss by filtration from drilling mud comprising clay suspended in aqueous medium and containing water soluble salt having flocculating effect on clays imparting undesirably high filtration rate to mud which comprises adding to mud gelatinized starchy material in filtration reducing quantity. No. 2,399,986. Thomas Chapman to Standard Oil Development Co.

Cracking hydrocarbon oils which comprises passing oil to be cracked in contact with active catalyst comprising bentonite clay activated by

* *Continued from Vol. 585, Nos. 3, 4, 5, Vol. 586, No. 1.*
(Continued on following page)

Patents Available for License or Sale

The Patent Office is regularly publishing a Register of Patents Available for Licensing or Sale. Patents concerning chemical products and processes appear below.

July 23, 1946

Pat. 2,391,885. **Flexible Joint.** Patented Jan. 1, 1946. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757.) Pipe joint is designed so that one of the members may have both longitudinal and rotational movement with respect to another. It has special application in pressing machines or the like in that it eliminates employment of conventional steam hose connection. The elements have freedom of movement without any danger of leakage and the joint does not require frequent packing. It is of simplified construction and among its features is provision of a spring within the joint which has a tendency to compress the packing at all times. (Owner) O'Connell H. Deshields, 528 North 32d St., Philadelphia 4, Pa. Group 35—69—82. Reg. No. 3,118.

July 30, 1946

Pat. 2,382,529. **Preparation of Chlorinated Rubber Compositions.** Patented Aug. 14, 1945. The process relates to the treatment of low cost fatty oils (corn, castor, cottonseed) which are not usually employed in the compounding of chlorinated rubber compositions. The oil is first treated with a salt capable of promoting heat-bodying and heated at temperatures ranging between 100° C. and 300° C. While at a high temperature, a dissolution promoting agent is sometimes added to render certain oils soluble in the solvent with which the chlorinated rubber is later blended. The addition of the oils provides protective or decorative coatings of easy brushing or spraying consistency. (Owner) Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J. Groups 28—11—34; 30—41. Reg. No. 3,250.

Pat. 2,382,530. **Manufacture of Soaps.** Patented Aug. 14, 1945. Group 28—41. Reg. No. 3,251.

Pat. 2,382,531. **Soap Manufacture.** Patented Aug. 14, 1945. Group 28—41. Reg. No. 3,252.

The two patents listed above relate to an anhydrous method of making soap from fatty oils, waste fatty materials, and the like. The method uses a closed vessel in which an alkali agent, rosin and the oil are heated for half an hour to relatively high temperatures of 150° C. to 350° C. The rosin functions to lighten the color and diminish the odor of soaps evolved from fish oils. Hydrogen peroxide is also added as a bleaching agent. The hardness of the product is controlled by amount of water added to the cooled mixture. The batch is then kneaded to guarantee uniformity. The method has several advantages, one of which is that it eliminates the drying step and its usual accompanying equipment. (Owner) Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J.

Pat. 2,382,532. **Vulcanized Fatty Oil Emulsions.** Patented Aug. 14, 1945. Groups 28—11—34; 30—41. Reg. No. 3,253.

Pat. 2,382,533. **Oil in Water Dispersions.** Patented Aug. 14, 1945. Groups 28—11—34; 30—41. Reg. No. 3,254.

The two patents listed above relate to the treatment of oil-in-water dispersions of vulcanized fatty oils (tung, olive, linseed, etc.) with one to two percent of methyl cellulose (by weight) in combination with a wetting agent (soap, etc.) known to reduce the surface tension at the oil and water interface. The emulsions produced in the process show good stability and are easily dilutable with water and may be used as rubber extenders or to render waterproof the surfaces of paper, stucco, wood, plaster, and cement. (Owner) Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J.

Pat. 2,384,061. **Modification of Rosin.** Patented Sept. 4, 1945. Group 28—11—81. Reg. 3,255.

Pat. 2,384,062. **Process for Modifying Rosin.** Patented Sept. 4, 1945. Group 28—11—81. Reg. No. 3,256.

Pat. 2,384,063. **Amine Treatment of Rosin.** Patented Sept. 4, 1945. Group 28—11—81. Reg. No. 3,257.

Pat. 2,384,064. **Treatment of Rosin with Amines.** Patented Sept. 4, 1945. Group 28—11—81. Reg. No. 3,258.

Pat. 2,396,671. **Rosin Treatment.** Patented Mar. 19, 1946. Group 28—11—81. Reg. No. 3,259.

The five patents listed above pertain to the treatment of gum or wood rosin so that various inherent properties such as brittleness, low melting point, or the like are modified and the rosin rendered soft or liquid, etc., better adapting it to industrial uses such as paper sizing, soap manufacture, the making of plastics, varnishes, etc. The process involves the heating of the rosin in the presence of a modifying agent, such as a metal soap or an aromatic amino compound at temperatures ranging from 100° C.

(Continued on following page)

(Continued from preceding page)

to 350° C., the temperatures being kept below boiling point to avoid distillation. Examples are given wherein varying percentages of the modifying agent are used and in which the reactions are carried out under vacuum, atmospheric pressure, using carbon dioxide, etc. The inventor claims the process imparts improved aging characteristics, water and alkali resistance, and other qualities to the final product. (Owner) Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J.

Pat. 2,396,669. **Treatment of Bituminous Material.** Patented Mar. 19, 1946. Benzidine, diphenyl-amine and like organic compounds, at percentages varying from 1% to 10%, are incorporated in bituminous materials such as asphalt, peat, lignite, shale, tar, and like materials and heated for half an hour at a temperature of 250° C. The process, when employed in the making of such articles as battery boxes, molded plastics, road making materials, paints and varnishes, imparts improved characteristics such as increased fusion point and toughness. (Owner) Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J. Group 28—11—34—83. Reg. No. 3,260.

Pat. 2,396,670. **Process for Modifying Fatty Oils.** Patented Mar. 19, 1946. Such oils as olive, soya bean, linseed, and other fatty oils are modified by the addition of fluorescein and heated at temperatures which avoid cracking or distillation. When used as an ingredient of plastics and varnishes the treated oil accelerates the rate of bodying, improves the drying characteristics and renders the varnish, etc., water and alkali resistant. (Owner) Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J. Group 28—11—34—83. Reg. No. 3,261.

August 6, 1946

Pat. 2,252,923. **Valve.** Patented Aug. 19, 1941. Cupshaped angle valve in which there is little or no wear on the sealing elements. As stem is turned, valve head passes through a flat annulus and resilient rubber gasket or ring. Flange on valve head forces annulus downward which compresses and expands gasket against sides of valve and around head to effect tight seal. Head does not rotate with stem, being swivelly connected thereto. (Owner) Frank A. Granetz, 23 Oakland Ave., Huntington, N. Y. Group 33—61—66. Reg. No. 3,267.

Pat. 1,956,765. **Apparatus for Producing High Vacuum.** Patented May 1, 1934. Metallic bellows, operating within a partially evacuated cabinet, works a pair of magnetic valves to effect the removal of gas from glass or metal during manufacture. The bellows and glass, etc., are heated or electrically bombarded to assist liberation of the gases. When compressed the corrugations of the bellows fit snugly to effect evacuation. Inventor claims device produces a gerater vacuum than that produced by centrifugal or mercury pump. (Owner) Bonnie G. Jones, Route 3, Williamsburg, Ky. Group 35—61. Reg. No. 3,270.

Pat. 2,212,314. **Water Resistant Amylaceous Compositions.** Patented Aug. 20, 1940. Prepared by the reaction between an amylaceous substance, formaldehyde and an acid, the composition forms a clear waterproof and water resistant film which dries without the application of heat. The composition is insoluble in most organic solvents such as acetone and chloroform and may be used to impregnate the surface of wood, paper, fabric, and other materials. Examples given in patent. Group 28—31. Reg. No. 3,281.

Pat. 2,367,247. **Combined Feed Mechanism and Weighing Device.** Patented Jan. 16, 1945. Combined weighing and grinding device has a scale dial associated with a weighing mechanism which causes the electric motor to be stopped when a predetermined weight is reached and the grinding device to discharge only exact amount of coffee, grain or other material being ground. (Owners) Wenceslao P. Valorino and Jose A. Monendoz. Address correspondence to Michael S. Striker, 500 Fifth Ave., New York 18, N. Y. Group 35—51. Reg. No. 3,285.

Pat. 2,353,510. **Idler Roller for Belt Conveyers.** Patented July 11, 1944. Roller contains cushioning rings or tubes of resilient material. Rings are so constructed and mounted that any impact on the roller is transmitted to the cushioning elements in shear. By subjecting the cushioning elements to shear rather than compression greater deflection is afforded for an equal volume of the resilient material and the elements are stressed substantially uniformly. These rollers greatly increase the life of a conveyer belt. (Co-owners) Charles A. Swartz, 4630 R. C. A. Bldg., New York 20, N. Y. Group 35—33. Reg. No. 3,290.

August 13, 1946

Pat. 2,399,556. **Fire Extinguisher.** Patented Apr. 30, 1946. For installation in high pressure fire extinguishing systems. Employs a chemical such as carbon tetrachloride and consists of a hollow body which supports a fragile glass bowl and a springed hammer held by a fusible link. Hammer is released when temperature reaches 165° F., breaking bowl, whereupon a fine spray is discharged. (Owner) James Knox Lumbar, La Junta, Colo. Group 39—99. Reg. No. 3,321.

(Continued from preceding page)

Molding moist plastic ceramic material preparatory to firing, which comprises interposing between surface of die and moist ceramic material a lubricating film of water-in-oil emulsion comprising mineral oil, water, and diamide formed by reacting ethanol ethylene diamine with substance from higher fatty acids and esters thereof, followed by reacting resulting monoamide with compound from lower fatty acids and anhydrides. No. 2,400,001. Logan Grupelli to National Oil Products Co.

Aqueous poly-disperse system having in disperse phase discrete particles containing synthetic rubber of vulcanizable type selected from (1) polymeric-condensation products of organic dihalides and inorganic polysulfides, (2) copolymers of conjugated diolefinic hydrocarbon and member of styrene, acrylonitrile, and isobutylene, and (3) polymeric haloprenes, and separate particles of heat-nonconvertible, flexible, highly condensed and polymerized plastic mass which comprises reaction product obtained by heating oil-modified alkyd resin and organic solvent-treatment with oxalic acid. No. 2,400,020. Jerry Pierce and Clellie Steele to Standard Oil Development Co.

Converting hydrocarbons which comprises subjecting hydrocarbons to cracking conditions in presence of oxygen and phosphorus oxychloride. No. 2,399,174. Hillis Folkins to The Pure Oil Co.

Reducing bromine number of olefinic gasoline. No. 2,399,224. Vladimir Haensel and Vladimir Ipatieff to Universal Oil Products Co.

Production of normally liquid isoparaffins from lower boiling isoparaffins with olefin. No. 2,399,240. Sumner McAllister, John Anderson and William Ross to Shell Development Co.

Reducing mono-olefin content of olefinic gasoline which comprises contacting olefinic gasoline with catalyst comprising composite of silica and magnesia, etc. No. 2,399,261. Charles Thomas to Universal Oil Products Co.

Production of normally liquid isoparaffis from lower boiling isoparaffins which comprises contacting low-boiling isoparaffin and ethylene with liquid concentrated hydrofluoric acid and finely divided nickel. No 2,399,353. Jean Jones to Phillips Petroleum Co.

Isomerization of paraffin hydrocarbons having at least four carbon atoms to isomers thereof having same number of carbon atoms but different chain structure. No. 2,399,354. John Kellett, III, Milton Marisic and Arlie O'Kelly to Socony-Vacuum Oil Co. Inc.

Converting low-boiling normal olefin and low-boiling isoparaffin into at least two different paraffins, one corresponding to said normal olefin and one having twice number of carbon atoms per molecule as said isoparaffin. No. 2,399,368. Maryan Matuszak to Phillips Petroleum Co.

Aviation gasoline containing from 1% to 15% hydrindene. No. 2,399,413. Frederick Weiss and Clifford Arbuthnot to Shell Development Co.

Desulphurization of hydrocarbon material which contains organic sulphur compounds, which comprises contacting material in admixture with hydrogen and unglowed chromiumoxide catalyst composed of coarse granules. No. 2,399,496. Maryan Matuszak and Glen Morey to Phillips Petroleum Co.

Precombustion cracking process. No. 2,399,540. Donald Carr to Union Oil Co. of California.

Drilling mud containing comminuted feathers to retard flow of the mud into crevices or fissures in earth structures. No. 2,398,347. Francis Anderson to Halliburton Oil Well Cementing Co.

Catalytic conversion process. No. 2,398,489. Maurice Arveson to Standard Oil Co.

Production of viscous, saturated hydrocarbon oil boiling above boiling range of gasoline, comprising alkylating viscous polymer of normal olefinic hydrocarbon with isobutane in presence of aluminum chloride catalyst. No. 2,398,495. Edmond D'Ouville and Bernard Shoemaker to Standard Oil Co.

Hydrocarbon conversion and fractionation system. No. 2,398,496. Wayne Edmister and Doyon Pollock to Standard Oil Co.

Preparing branch chain hydrocarbons. No. 2,398,563. William Smith and Arthur Goldsby to The Texas Co.

Analyzing sample of drilling mud for hydrocarbons, which comprises placing sample in isolated heating zone, rapidly evacuating releasable gases and vapors and separating vapors thus released, etc. No. 2,398,580. Francis Crawford to Phillips Petroleum Co.

Producing improved yields of aromatic hydrocarbons boiling in gasoline range which comprises contacting hydrocarbon feed mixture boiling within 150-375° F. and comprising olefins, paraffins, naphthenes, and aromatics, with bauxite catalyst. No. 2,398,674. Walter Schulze to Phillips Petroleum Co.

Catalytic cracking of hydrocarbon oils boiling above about 311° F. No. 2,398,739. Bernard Greensfelder and Stanley Perry to Shell Development Co.

Catalytically converting hydrocarbons wherein fluid hydrocarbon is endothermically reacted in zone containing compact bed of solid catalyst particles whereby combustible contaminants are accumulated by catalyst. No. 2,398,759. Charles Angell to Universal Oil Products Co.

Cracking hydrocarbon oil which comprises passing oil through cracking zone containing catalyst comprising alumina and boron compound and wherein alumina is treated with salt containing boron and fluorine. No. 2,398,773. Gerald Connolly to Standard Oil Development Co.

Cracking process for production of gasoline hydrocarbons which comprises obtaining mixture of both paraffin and naphthene hydrocarbons boiling in gas oil range, passing mixture through zone containing two different catalysts, one comprising aluminum fluoride and being more effective in cracking naphthene than paraffin hydrocarbons and other comprising boron oxide and being more effective in cracking paraffin hydrocarbons. No. 2,398,819. Leon Cook to The Texas Co.

Refining total products of a catalytically cracked gas oil. No. 2,398,846. John Munday to Standard Oil Development Co.

Production of aviation safety fuel by alkylation of isoparaffinic hydrocarbons with normally gaseous olefinic hydrocarbons in presence of aluminum chloride-saturated hydrocarbon complex. No. 2,398,869. Ernest Thiele to Standard Oil Co.

Alkylation process which comprises reacting isoparaffin with olefin in presence of liquid hydrogen fluoride catalyst to which has been added non-oxidizing compound from acids of phosphorus and their anhydrides and esters. No. 2,398,905. Carl Linn to Universal Oil Products Co.

Preparing high anti-knock aviation fuel from normally gaseous hydrocarbons. No. 2,398,908. Pharis Miller to Standard Catalytic Co.

Desulphurizing sulphur contaminated hydrocarbon oils. No. 2,398,919. Alva Byrns to Union Oil Co. of California.

Hydraulic fluid and lubricating oil comprising high boiling isoparaffin produced by reacting olefin with low boiling isoparaffin blended with, to change viscosity index, polymer of low boiling olefin. No. 2,398,943. Myron Kollen to Union Oil Co. of California.

Isomerizing paraffin hydrocarbons, and alykylating branched paraffin isomers for production of alkylate fuel. No. 2,399,093. William Bonnell and William Weinrich to Gulf Research & Development Co.

Reclaiming crankcase or similar oil compounds, which consists in subjecting oil compounds as they leave crankcase to solvent to dissolve impurities and neutralize acids, and to centrifugal force and stirring force, then subjecting oil and solvent in respective parallel surface area sheets to contact actions, etc. No. 2,399,140. Melville Peters and Anne Beal to Fred McCarthy.

* *Photographic*

Photographic silver halide emulsion from silver chlorobromide, silver bromide and silver bromiodide emulsions spectrally sensitized with sensitizing cyanine dye containing, as supersensitizer, a heterocyclic nitrogen base having but one nitrogen atom in heterocyclic ring, etc. No. 2,398,778. Burt Carroll and John Spence to Eastman Kodak Co.

Photographic compound consisting of two parts of two parts of ferrous ammonium citrate and one part of potassium ferricyanide dissolved

* *Continued from Vol. 585, Nos. 3, 4, 5, Vol. 586, No. 1.*
(Continued on following page)

in water with one fiftieth (1/50) part of potassium bichromate dissolved therein. No. 2,398,986. Woodrow Wilson to Wilson Lorraine Co.

Producing gelatino-silver halide emulsion layers which predominate in silver bromide and contain sulfur sensitizer, including precipitation, washing and digestion stages and coating; step which comprises digesting such emulsions on acid side in presence of soluble gold salt smaller than that which would make any difference to tone of developed silver images. No. 2,399,083. Cecil Waller, Ronald Collins and Edward Dodd to Ilford Ltd.

* *Polymers*

Copolymer of ethenyloxyacetic acid ester with polymerizable olefin hydrocarbon of not more than five carbon atoms and of molecular weight above 30 which has methylene group attached by ethylenic double bond. No. 2,399,626. Donald Coffman to E. I. du Pont de Nemours & Co.

Obtaining solid, macromolecular, partially hydrolyzed ethylene/vinyl acetate interpolymer, which comprises heating in absence of primary alcohol, a solid, macromolecular interpolymer of ethylene with vinyl acetate, dissolved in liquid medium containing potassium hydroxide and straight chain saturated aliphatic secondary alcohol. No. 2,399,653. John Roland, Jr. to E. I. du Pont de Nemours & Co.

Making liquid vinyl resin dispersion which can be blended with rubber latex to form stable emulsions capable of controlled and uniform coagulation, which comprises forming mixture consisting of liquid monomeric alpha-unsaturated aliphatic acid, and liquid monomeric acrylonitrile compound, and subjecting mixture to controlled heat polymerization. No. 2,399,684. Gerry Mack to Advance Solvents & Chemical Corp

Fusible, soluble alkyd resin comprising reaction product obtained by simultaneous heating of polymerized rosin, alpha, beta-unsaturated organic polycarboxylic acid and polyhydric alcohol. No. 2,399,692. Ernest Peterson to Hercules Powder Co.

Producing resin comprising reacting aldehyde from formaldehyde, paraformaldehyde, trioxymethylene and furfuraldehyde with chlorinated phenol. No. 2,399,735. Mortimer Harvey to The Harvel Corp.

Lining of pipe with plastic material, which comprises drawing flexible walled tubular member into pipe to be lined, charging tubular member with lining material and thereafter while withdrawing tubular member applying pressure to exterior of member. No. 2,399,849. Charles Bennett.

Laminated armor plate structure comprising oriented laminae composed of synthetic linear superpolymer, said laminae firmly bonded to each other by diphenolyol propaneformaldehyde resin. No. 2,399,184. Winfield Heckert to E. I. du Pont de Nemours & Co.

Making planographic printing plate which comprises coating base with completely hydrolyzed vinyl acetate-ethylene polymer having, after hydrolysis, 3-30 ethylene in copolymer and selectively locating grease-receptive printing layers. No. 2,399,208. Cole Coolidge to E. I. du Pont de Nemours & Co.

Preparation of convertible alkyd resin which comprises heating and reacting in inert atmosphere glycidol allyl ether with compound from dicarboxylic acids and dicarboxylic acid anhydrides. No. 2,399,214. Theodore Evans and David Adelson to Shell Development Co.

Softening solid, plastic hydrocarbon interpolymer compound which is reactive with sulfur to give elastic product prepared by reacting together isobutylene with low molecular weight aliphatic diolefin in presence of Friedel-Crafts catalyst dissolved in organic solvent and mixing into polymer an internal-friction reducing agent. No. 2,399,262. Robert Thomas and Francis Baldwin to Jasco, Inc.

Polyvinyl acetal plastic composition containing 1,4-diphenoxybutene-2. No. 2,399,330. George Deebel to Monsanto Chemical Co.

Moldable, plasticized composition comprising polyvinyl alcohol containing 50 molar percent of hydroxyl groups and, as plasticizers therefor, between 5% and 75%, of benzaldehyde and between 10% and 150% of glycerol. No. 2,399,401. Harold Sonnichsen and Robert Gager to E. I. du Pont de Nemours & Co.

Preparing interpolymers of chloroprene with vinylidine compounds by emulsion polymerization of the monomers wherein some of vinylidine compound monomer remains unpolymerized after all of chloroprene has been polymerized, which comprises adding aliphatic 1,3-butadiene hydrocarbon to emulsion and completeing polymerization. No. 2,399,407. Frederick Wagner to E. I. du Pont de Nemours & Co.

Plasticizing polymerized vinyl alcohol which comprises admixing in solid state, polymerized vinyl alcohol with solid polyoxymethylene glycol. No. 2,399,456. Edward Yates and Robert Gager to E. I. du Pont de Nemours & Co.

Organic polymeric adhesive material soluble in light hydrocarbon solvents and selected from natural and synthetic hydrocarbon base rubbers, dissolved in solvent comprising branched chain paraffin. No. 2,399,558. Edward McArdle and Anthony Robertson to Standard Oil Development Co.

Making molded thermoplastic hollow article having thin-walled sections. No. 2,399,592. Russell Bradshaw to The Dow Chemical Co.

Preparing aqueous emulsion of polyvinyl acetate having viscosity within range from 1.5 to 300 centipoises.

Forming alkyl acrylate polymer into elastic substance having properties similar to those of vulcanized natural rubber, which comprises milling hydrated lime into alkyl acrylate polymer while in plastic condition, molding milled plastic mixture, and then heating molded mixture. No. 2,398,350. Francis Clarke Atwood and Henry Hill to National Dairy Products Corp.

Resinous reaction product in hardenable form obtained from phenol and aldehyde and agent for accelerating hardening thereof comprising compound having acid type reaction and of formula $(R'.NH.SO_3)_xR$ wherein R' represents member of hydrogen, hydrocarbon radicals and NH_4SO_3—, R is a cation of valence x and x is a whole number. No. 2,398,361. Rupert Daniels to Bakelite Corp.

Making laminated stock comprising curing under pressure at 100° C. to 110° C. a plurality of assembled fibrous laminae impregnated with resinous reaction product of mixture of a resorcin and formaldehyde in presence of mild alkaline catalyst having buffering action. No. 2,398,388. Arthur Norton to Pennsylvania Coal Products Co.

Hardenable resinous ester, soluble in organic solvents, of ether of aminotriazine-formaldehyde condensation product esterified with esterifying agent consisting of fatty acid containing at least ten carbon atoms. No. 2,398,569. Gustav Widmer to Ciba Products Corp.

Inhibiting dimensional changes in wood induced by moisture and exposure which comprises impregnating wood with solution consisting of water and active methylolureas, having dimethylolurea and monomethylolurea. No. 2,398,649. Hamline Kvalnes to E. I. du Pont de Nemours & Co.

Making soluble resinous reaction product which comprises heating abietic acid ester and allyl ester of alpha unsaturated alpha beta dicarboxylic acid. No. 2,398,668. John Rust to Montclair Research Corp.

Making soluble rainous reaction product which comprises heating abietic acid ester and allyl ester of a saturated polycarboxylic acid miscible therewith. No. 2,398,669. John Rust to Montclair Research Corp.

Making polysiloxane resin from mixture of halogenosilanes capable of forming resin upon hydrolysis and condensation, said mixture including monovalent hydrocarbon-substituted halogenosilane. No. 2,398,672. Robert Sauer to General Electric Co.

Solid thermoplastic copolymer of styrene and nuclear halogenated styrene having not more than two halogen atoms in molecule. No. 2,398,736. Robert Dreishbach to The Dow Chemical Co.

Thermoplastic composition from polystyrene resins, methyl methacrylate resins and cellulose esters plasticized with mixture of alkyl halophthalates obtained by esterification of a lower aliphatic alcohol with phthalic anhydride halogenated. No. 2,398,882. Charles Clark to The Mathieson Alkali Works, Inc.

Preparing artificial resin having drying properties, which comprises maintaining mixture of drying glyceride oil, cyclopentadiene, and polymerization catalyst, at above 30° C., until a copolymer of oil and cyclopentadiene soluble in hydrocarbon thinners is obtained. No. 2,398,889. Howard Gerhart to Pittsburgh Plate Glass Co.

Obtaining polymers which comprises ploymerizing organic compound containing as sole carbon to carbon unsaturation only one double bond by heating compound at 150° to 400° C. under pressure of 200 atmospheres in contact with amine oxide catalyst. No. 2,398,926. George Dorough to E. I. du Pont de Nemours & Co.

Softening and plasticizing polymeric organic sulphide obtained by reaction of alkaline polysulphide and aliphatic dihalide having halogen on separate carbon atoms which comprises subjecting sulphide to milling in presence of small amounts, to increase plasticity of polymer, each of organic base and sulphide of structure described in patent. No. 2,398,998. Edward Blake to Monsanto Chemical Co.

* *Processes and Methods*

Treatment of gas mixture comprising two hydrate-forming gases. No. 2,399,723. John Crowther to The M. W. Kellogg Co.

Breaking emulsion formed by vigorous agitation of mixture of compound of liquid hydrocarbons and nitro-hydrocarbons with acid solution containing strong dehydrating acid, which comprises adding to emulsion a compound taken from acid-soluble and acid-decomposable inorganic fluorides. No. 2,399,206. James Castner and Wesley Nagle to E. I. du Pont de Nemours & Co.

Method of dehydrating which comprises forming film of material to be dehydrated, subjecting film to reduced pressure to promote evaporation, and passing evolved vapors into desiccant which is in heat exchanging relation with evaporating zone. No. 2,399,246. Walter Patrick, Jr. and John Elder; said Elder to Crown Cork & Seal Co. Inc.

Heating gas with recirculated hot elements. No. 2,399,450. Charles Ramseyer to H. A. Brassert & Co.

Temperature control in regeneration of contact masses by flowing oxygen-insensitive liquid heat transfer medium combustion supporting gas. No. 2,399,532. Armand Abrams to Socony-Vacuum Oil Co. Inc.

Purifying vapor discharged from fluid evaporator which comprises contacting vapor with inflowing fluid for evaporator in washing and diluting zone. No. 2,398,396. James Powell.

Polarizing crystalline formation by transfer and expansion. No. 2,398,435. Alvin Marks.

Separating components of fluid mixture containing components having affinities for magnetic substance which vary with temperature, said components forming solid precipitates thereon at different temperatures, etc. No. 2,398,725. August Henry Schutte.

Separating gases which comprises passing vapors through adsorbent material contained in enclosed space of gradually reducing cross-sectional area and heating adsorbent material progressively from large to reduced area of mass to separate absorbed components into fractions of gases in sequence in which they are released by distillation. No. 2,398,817. Nelson Turner.

Separating gases in fractionating column containing activated charcoal. No. 2,399,095. Guy Burrell and Lloyd Guild to Burrell Technical Supply Co.

* *Rubber*

Rubber accelerator admixed with bentonite, said composition being dry. No. 2,399,655. William Alton to R. T. Vanderbilt Co. Inc.

Preparing solid rubberlike materials by polymerizing isomonoolefin in alkyl chloride diluent containing less than 5 carbon atoms per molecule in contact with Friedel-Crafts type catalyst dissolved in alkyl chloride containing less than 5 carbon atoms. No. 2,399,672. Arthur Green, Stanley Lane and Edward Marshall to Jasco, Inc.

Preparing viscous liquid to plastic composition compatible with synthetic rubber and containing between 5 and 35% sulphur in form available for vulcanization, said composition being stable as to separation and crystallization of sulphur at atmospheric temperatures. No. 2,399,694. Fritz Rostler, Heinz Sternberg and Hubert du Pont to Wilmington Chemical Corp.

Vulcanizable compound comprising rubber-like copolymer of butadiene and styrene, copper salt of dialkyl-dithiocarbamic acid to accelerate rate of cure upon vulcanization, and sulfur exceeding amount required to convert all of copper in copper salt to cupric sulfide. No. 2,399,945. Albert Somerville to R. T. Vanderbilt Co. Inc.

Vulcanizable compound comprising rubbery copolymer of butadiene and styrene, mixture of bitumen and oil soluble copper soap, and sulfur exceeding amount required to convert all of copper to cupric sulfide, bitumen facilitating dispersion of copper soap in copolymer. No. 2,399,946. Albert Somerville to R. T. Vanderbilt Co. Inc.

Vulcanizable compound comprising rubbery copolymer of butadiene and styrene, chemically inert filler carrying copper salt, and sulfur exceeding amount required to convert all of copper to cupric sulfide. No. 2,399,947. Albert Somerville to R. T. Vanderbilt Co. Inc.

Vulcanizable compound comprising rubber-like copolymer of butadiene and styrene, copper salt of mercapto-benzothiazole to accelerate rate of cure upon vulcanization, and sulfur. No. 2,399,948. Albert Somerville to R. T. Vanderbilt Co. Inc.

Vulcanization of rubber-like copolymer of butadiene and styrene containing material of class of metallic copper and compounds of copper to accelerate sulfur vulcanization of copolymer, in excess of sulfur and copolymer of compound of thiuram sulfides and dithiocarbamates as sulfur vulcanization accelerators. No. 2,399,949. Albert Somerville to R. T. Vanderbilt Co. Inc.

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Rubbery copolymer of butadiene and acrylonitrile containing material selected from metallic copper and compounds of copper to accelerate sulfur vulcanization of copolymer and an excess of sulfur. No. 2,400,029. Albert Somerville to R. T. Vanderbilt Co. Inc.

Product of vulcanization of rubbery copolymer of butadiene and styrene containing material of class of metallic copper and compounds of copper to accelerate vulcanization of copolymer and an excess of sulfur. No. 2,400,057. Albert Somerville to R. T. Vanderbilt Co. Inc.

Purification of latices of rubber, balata, gutta percha, jelutong, abiurana, gondang and like, which comprises treating latex with dilute caustic alkali to cause precipitation of heavy impurities. No. 2,398,613. Hendrik Braak to P. Honig, Commissioner of the Board for Economic and Financial Affairs of The Netherlands Indies, as trustee.

Preparation of rubbery polymerizate. No. 2,398,976. Charles Thomas to Monsanto Chemical Co.

Adhering rubber to surface of metal which has property of forming a dark-colored metal sulfide. No. 2,399,019. Hershel Grinter and Malcolm Gross to The B. F. Goodrich Co.

Purifying raw resinous rubber selected from guayule and dandelion. No. 2,399,156. Paul Stamberger, Roderick Koenig and Roy Hanslick to the Secretary of Agriculture of the United States of America.

* *Specialties*

Leather dressing capable of removing accumulated layers of polishes, dirt and dark spots without affecting tannery finish or resulting in solid accumulations, dressing containing shellac and oil soluble phenol formaldehyde resin, volatile organic liquid non-hydrocarbon non-chlorinated-hydrocarbon solvent for shellac and resin, balance of composition being diluting, cleaning vehicle selected from volatile liquid hydrocarbon and volatile liquid chlorinated hydrocarbon. No. 2,399,693. Jacob Ratner.

Making gasket material resistant to petroleum and organic solvents and provided with elastomeric surface, which comprises adding solution in propylene dichloride of petroleum hydrocarbon insoluble pine wood resin to dispersion with propylene dichloride of reaction product of organic dihalides with soluble inorganic polysulfides to form coating compound, coating smooth surfaced non-absorptive paper board with compound, etc. No. 2,399,804. Leander Hills and Alexander Gordon to The Vellumoid Co.

Mineral oil composition comprising mineral oil fraction having in admixture, to improve viscosity characteristics of oil fraction, an oil-soluble, neutral co-polymer of a diolefin and a carbonyl compound selected from unsaturated aliphatic ketone and aliphatic aldehyde. No. 2,399,817. Ronald Meyer to Socony-Vacuum Oil Co. Inc.

Dry glue base, to be mixed with water to form spreadable glue, which contains pulverous urea-formaldehyde condensation product largely water-soluble mixed with conditioner selected from aluminum phosphate ferric phosphate, silica and clay. No. 2,399,980. Lawrence Bradshaw, Francis Morrow and Carl MacLagan to The Borden Co.

Insect repellent composition. No. 2,400,006. Howard Jones and Bernard Travis to the Secretary of Agriculture of the United States of America.

Bonded abrasive article comprising abrasive particles and co-polymer being vulcanized to rigid condition. No. 2,400,036. Charles Wooddell and Edward Hager to The Carborundum Co.

Normalizing hot pressed plywood panels which comprises taking panels in heated condition and placing them in spaced apart relationship in a chamber, creating fog of minute water particles in atmosphere of chamber. No. 2,400,051. Michel Pasquier.

Manufacturing powder to be transformed into articles molded under heat and pressure which comprises adding montan wax with conc. nitric acid to cyanamide compound of alkaline earth metal, then adding this mixture to sulphite waste liquor, adding filler, drying and grinding to powder. No. 2,400,053. Eberhard Rheinberger.

Production of powdered adhesive comprising reducing native keratin in aqueous alkaline sulfide solution, dispersing reduced product in caustic soda solution, drying resulting liquid. No. 2,399,161. George Brother and Charles Binkley to the Secretary of Agriculture of the United States of America.

Composition for use as lubricant and as addition agent to improve characteristics of lubricating oils and greases, comprising reaction product of phosphorus sulfide with fatty acid ester of a mono-atomic alcohol. No. 2,399,243. John Musselman to The Standard Oil Co.

Mastic-type composition, formed of aluminous cement, alpha gypsum and aqueous oil-in-water type emulsion of substance selected from bitumens, waxes and resins. No. 2,399,411. Vilas Watts and Paul McCoy to American Bitumals Co.

Stable liquid dust-laying composition resistant to removal from soil by water and having high wetting power comprising low viscosity, low volatility petroleum distillate oil, naphthenic acid, wetting agent consisting of sodium salt of a sulfonated higher alcohol, water, and germicide. No. 2,399,464. Edward Butcher to Gulf Research & Development Co.

Stable liquid dust-laying composition resistant to removal from soil by water, consisting of a petroleum distillate oil, oleic acid and metal naphthenate. No. 2,399,465. Edward Butcher to Gulf Research & Development Co.

Shoe lining comprising ply of woven textile fabric carrying rubberized compound, and coating in form of band solidified from molten mixture of wax, rosin and rubber. No. 2,399,492. Stanley Lovell and Frank Russell to Beckwith Manuacturing Co.

Preventing corrosion of metal parts of steam turbines lubricated by highly refined paraffinic oil containing water-insoluble alkyl phenolic antioxidant in presence of salt water comprising incorporating in oil, cyclohexylamine oleate. No. 2,399,510. Albert Rocchini to Gulf Research & Development Co.

Wax composition comprising oil-free crystalline paraffinic petroleum wax normally tending to crack upon sudden chilling to sub-atmospheric temperatures and having incorporated therein solvent-deoiled, oil-free paraffinic amorphous wax to inhibit tendency of crystalline wax to crack. No. 2,399,521. Walter Tyler to Tide Water Associated Oil Co.

Oil and to stabilize oil, a compound of R—(x)n—R_1 where R and R_1 are like or unlike aliphatic radicals, X is element from selenium and tellurium and n has value of 1 or 2. No. 2,398,415. George Denison, Jr. and Paul Condit to California Research Corp.

Oil of lubricating viscosity and to improve oil, a metal salt detergent and compound described in patent. No. 2,398,416. George Denison, Jr. and Paul Condit to California Research Corp.

Preparation of surface active products containing one sulfonic acid group and plurality of units corresponding to olefin of less than four carbon atoms which comprises reacting olefin with aqueous solution of water-soluble salt of sulfurous acid. No. 2,398,426. William Hanford to E. I. du Pont de Nemours & Co.

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Waterless cutting oil, comprising reaction product of phosphorus pentasulphide and mineral oil residual corrosiveness being eliminated by unsaturated fat, and with inclusion of dioctyl ester of sodium sulphosuccinic acid. No. 2,398,429. Everett Hughes to The Standard Oil Co.

Fuel unit for use in open fireplace comprising body of combustible material provided with plurality of recesses, chemical salts in solid form introduced into recesses, said chemical salts being of class which produce colored flames. No. 2,398,571. Clarence Young.

Luminescent cathode ray screen material consisting of activated silicate of metal from zinc and cadmium having incorporated arsenic oxide. No. 2,398,629. Gorton Fonda to General Electric Co.

Exterior insulation board unit comprising fibrous base sheet, smooth tough water vapor permeable weather resistant decorative surface upon exposed face, comprising smoothened commingled mass of heat hardenable drying oil material and fibers of base sheet, and surface decorative coating of emulsion paint over commingled mass, and water vapor impervious film upon interior face of sheet. No. 2,398,632. Orcutt Frost and James Conover to United States Gypsum Co.

Compass fluid which is liquid and free-flowing at temperatures below minus 80° F. and has small viscosity change over atmospheric temperature range at which aircraft operate, consisting of mixture of 1-nitropropane, ethyl silicate, and pseudo cumene fraction. No. 2,398,662. John Morgan and Russell Lowe to Cities Service Oil Co.

Modified rosin ester-drying oil varnish bases and process of making same. No. 2,398,670. John Rust to Montclair Research Corp.

Artificial-tooth-forming element for prosthetic dental appliance, comprising: body portion of rigid completely-polymerized synthetic resin, minor body portion formed of synthetic resin in non-completely-polymerized state having quality of plastic flow under manually-imposable stress and having property of homogenous molecular union with resin of major body portion. No. 2,398,671. Jacob Saffir to The Dentists' Supply Co.

Unitary porous rigid dielectric metalloidal body characterized by honeycomb structure and apparent density less than water, said body consisting of finely divided particles of metal of magnesium and aluminum bonded together with acidic resinous reaction product of maleic acid. No. 2,398,703. Henry Gardner.

Sealing tape comprising strip of sheet material coated with thermoplastic adhesive composition including asphalt blended with unmilled reaction product of rubber and a halogen acid of tin. No. 2,398,735. Lewis Davis and Edwin Tuukkanen to McLaurin-Jones Co.

Producing aerated, floating soap mass for use in bar or cake form, having compatible gas dispersed throughout mass in form of microscopic cells or bubbles and suitable for producing unique whiteness and opaqueness in uncolored soap mass. No. 2,398,776. John Bodman to Lever Brothers Co.

Making reinforced abrasive articles comprising pressing mixture of abrasive grain and low temperature cure bond onto layer of uncured tie bond comprising elastomer in sheet form. No. 2,398,890. Elmer Howard to The Carborundum Co.

Lubricating grease comprising mineral oil-soluble soap of a rosin having about 50% of double bonds saturated with hydrogen, in conjunction with mineral oil. No. 2,399,063. Jacob Schantz to Hercules Powder Co.

Water-soluble solid composition characterized by constant rate of solution in water, comprising mixture of sodium carbonate and solution of tartaric acid in a polyethylene glycol. No. 2,399,085. Arthur Winslow to General Electric Co.

* *Textiles*

Coloration of fabrics, which comprises impregnating fabric of comparatively compact construction containing yarns of cellulose acetate with Turkey red oil, drying impregnated fabric, scouring, and subjecting fabric to winch dyeing operation. No. 2,399,627. Cyril Croft and Walter Hindle to Celanese Corp. of America.

Producing lustrous artificial filaments of polyvinyl alcohol which comprises dissolving polyvinyl alcohol in water to give non-gelatinous solution, extruding solution through multi-hole jet into coagulating bath consisting of 94% of acetone and 6% of water to form thread, passing thread through bath of 50% hydroxy-ethoxy-ethyl ether and 50% of water, stretching thread. No. 2,399,970. Donald Wilson to Courtaulds, Ltd.

Forming sliver of artificial fiber which comprises forming composite of filament-forming material and another material, both being in flowable condition and immiscible with each other so that each retains its separate identity, continuously feeding composite through adjacent orifices adapted to extrude filaments which together constitute a sliver. No. 2,399,191. William Abbott, Jr.

Improving handle and appearance of mixed fabrics containing wool and fibers of regenerated cellulose which comprises treating fabrics at boiling point with dilute weakly alkaline solution of ammonium salt of acid and compound selected from sulphonated higher fatty alcohols, sulphonated higher fatty acids and sulphonated higher fatty acid esters. No. 2,399,559. John McKeown, Gibbet Hill and William Penn to Courtaulds, Ltd.

Crayon for marking textile materials which comprises mixing water dispersible color carrier, from clay, fuller's earth, infusorial earth, combinations thereof and mixtures with bentonite, in water solution with phosphate salt selected from potassium and sodium phosphate, adding dye to give desired shade. No. 2,398,559. Robert Robinson to Uxbridge Worsted Co. Inc.

Production of protein products of low shrinkage characteristics comprising spinning solution of casein in dilute alkali into aqueous spinning bath having pH higher than 2 and containing lactic acid, a lactate and inorganic salt in solution therein. No. 2,398,625. George de Kadt.

Apparatus for treating running thread. No. 2,398,856. Raymond Reel to Celanese Corp. of America.

Mustard-gas-proof apparel which is coated with stratified non-water-soluble solid synthetic linear polyamide and polyvinyl alcohol films. No. 2,399,027. Herbert Heribert.

Spinning solution which comprises homogeneous aqueous solution containing water-insoluble protein of class of globulins, prolamines and phosphoproteins, water-soluble salt of a synthetic linear polymeric carboxylic acid, and basic agent selected from ammonia, alkali metal hydroxides, and basic salts of alkali metals. No. 2,399,084. Frederick Watson to E. I. du Pont de Nemours & So.

* *Water, Sewage, and Sanitation*

Water purifier comprising vessel containing water to be purified, pair of oppositely disposed imperforate plate electrodes immersed in water and having closely spaced parallel surfaces, etc. No. 2,399,289. Frank Negus to Aqua-Electric Corp. Ltd.

Biochemical

Refining gelatin, which comprises adding to aqueous solution of gelatin containing albumin therein and having pH of 4.7-4.8, a neutral organic water-miscible liquid dehydrating agent selected from water-miscible ketones, alcohols, and keto-alcohols, whereby albumin therein is precipitated. No. 2,400,375. Samuel Sheppard and Robert Houck to Eastman Kodak Co.

Treatment of keratin-containing fibers comprising solution of acid sulphite in water and alcohol at about pH 4. No. 2,400,377. John Speakman to Perm Ltd.

Removing foreign colors and objectionable flavors from lacteal products which comprises admixing with products diketone selected from diacetyl, 2,3-pentadione, 2,3-hexadione, 3,4-hexadione and 3,4-heptadione. No. 2,400,454. Niels Christensen and Roland Sturhahn.

Manufacturing hesperidin. No. 2,400,693. Ralph Higby to California Fruit Growers Exchange.

Preparing riboflavin which comprises growing fungus, Eremothecium ashbyii, in liquid medium containing water, animal proteinaceous material, carbohydrate, and malt extract while aerating medium. No. 2,400,710. Henry Piersma to Lederle Laboratories, Inc.

Mixture of vegetable phosphatide, a glyceride oil, and oil-dispersible, acid-liberating compound to increase solubility of phosphatide in the oil. No. 2,400,120. Percy Julian and Edwin Meyer to American Lecithin Co.

Solution of zein in solvent selected from aqueous acetone and aqueous lower aliphatic alcohols containing therein 1 to 10% of ethylene oxide. No. 2,401,685. Hugh Hagemeyer, Jr. to Eastman Kodak Co.

Cellulose

Molded structural material having specific gravity between 0.1 and 0.5 and suitable for paneling, said material consisting of wood chips bonded together by binder consisting of solvent-free plasticized substance selected from water-insoluble organic esters and ethers of cellulose. No. 2,400,078. Henry Dreyfus, William Walker and James Rooney; said Walker and said Rooney to British Celanese Ltd; Claude Bonard administrator of said Henry Dreyfus, deceased.

Activating cellulose to prepare it for esterification which comprises treating cellulose with mixture of fatty acid of 3-4 carbon atoms, formic acid, and sulfuric acid. No. 2,400,361. Carl Malm and Loring Blanchard, Jr., to Eastman Kodak Co.

Purifying cellulose esters of higher fatty acids which are contaminated with free higher fatty acid and cellulosic impurities which comprises **removing free fatty acid by treatment with aqueous ethyl alcohol. No. 2,400,494. James Fisher to British Celanese Ltd.**

Preparing highly absorbent cellulose material from wood. No. 2,400,546. Frederick Kressman to Continental Turpentine & Rosin Corp. Inc.

Cellulose acetate and plasticizer therefor comprising dimethyl azelate. No 2,401,272. Joseph Quinn to E. I. du Pont de Nemours & Co.

Production of organic acid esters of cellulose, which comprises esterfying cellulose with organic acid anhydride in liquid medium which is solvent for primary ester formed and ripening primary ester in solution in acidic ripening medium comprising water and a phenolic hydroxy compound. No. 2,401,304. John Jones to British Celanese Ltd.

Treating cellulose to make same fire-resistant, comprising reacting cellulose-containing fibers with phosphoryl chloride under conditions to form with a part thereof a cellulose phosphoryl chloride and thereupon treating product with ammonia to convert said phosphoryl chloride to corresponding amide. No. 2,401,440. Charles Thomas and Gennady Kosolapoff to Monsanto Chemical Co.

Ceramics

Light-weight aggregate comprising ceramic foamed mass formed by mixing aqueous solution of aluminum compound with solution of oxy-silicon compound, mixed in proportions such that true zeolite gel is formed, foaming said mass. No. 2,400,087. Philip Harth.

Fluorescent glass composition. No. 2,400,147. Joseph Hooley to Corning Glass Works.

Vitrified product of homogeneous mixture consisting of (1) finely divided mica and (2) finely divided non-siliceous bonding agent, latter consisting of lead borate and fluorine compound of alkali metal. No. 2,400,337. Guenther Buechner to General Electric Co.

Manufacturing tempered glass in which glass sheet is first heated to temperature approximating softening point and then chilled, comprising chilling sheet by plurality of spaced, continuous streams of cooling fluid. No. 2,401,442. Theodor Weihs, by judicial change of name Theodor White, to American Window Glass Co.

Imparting high resistance to transmission of ultraviolet and infra-red rays to sheet of ordinary glass, low in such resistance, which consists in etching sheet with strong mineral acid until superficial film, enriched in silica and impoverished in alkali and alkali earth metals is formed, then applying to film ferrous and ferric salts in solution to effect base exchange and impregnate film with ferrous and ferric compounds. No. 2,401,537. Frederick Adams to Pittsburgh Plate Glass Co.

Forming cellular glass body by sintering finely crushed glass and gassing agent adapted to liberate gases at sintering temperature of glass in a mold comprising suddenly partially cooling mold after sintering operation, exposing mold after sintering operation, exposing mold to high frequency field quickly to heat it and to free cellulated body from mold surfaces. No. 2,401,582. William Owen to Pittsburgh Plate Glass Co.

Coatings

Coating paper articles with aluminum, which comprises wetting surface of articles with glycerine and then spraying fused aluminum upon wetted surface. No. 2,400,304. William Hamel, two-thirds to Armand Lackenbach, and one-third to Louis Stark and Samuel Kaplan.

Coating composition comprising cellulose acetate butyrate having acetyl content of 28 to 33%, and butyryl content of 14 to 20%, dissolved in solvent thereof free from monohyric aliphatic alcohols, said coating composition having reduced temperatures. No. 2,400,453. Charles Bogin to Commercial Solvents Corp.

Protecting silverware from tarnishing which comprises applying to surface a dilute aqueous solution of a fatty acid salt of primary aliphatic amine. No. 2,400,784. John Rust to Montclair Research Corp.

Protecting silverware from tarnishing which comprises applying to surface a dilute aqueous solution of a water-soluble product of partial neutralization of a polyethylene polyamine by a fatty acid. No. 2,400,785. John Rust to Montclair Research Corp.

Protecting silverware from tarnishing which comprises applying to surface a dilute aqueous solution of a fatty acid salt of a compound selected from guanidine and substituted guanidines. No. 2,400,786. John Rust to Montclair Research Corp.

Optical element comprised of transparent support having on a surface, non-crystalline molecular coating of individually oriented molecules of a dichroic substance. No. 2,400,877. John Dreyer.

Wax coating composition, comprising mixture of ester type rosin, stearic acid and paraffin wax. No. 2,401,217. Michael Berliney, Garfield Bowden, and Jack Hohnstine to Boyle-Midway Inc.

Athletic racket string comprising corded structure having smooth coating of interpolyamide prepared from hexamethylenediammonium adipate, hexamethylenediammonium sebacate and caprolactam, said coating giving protection against abrasion when string is pulled through sharp bends. No. 2,401,291. Albert Smith to E. I. du Pont de Nemours & Co.

Metal coating process and apparatus therefor. No. 2,401,374. Tadeusz Sendzimir to Armzen Co.

Dyestuffs

Preparing copper complex derivatives of azo dye compounds by reacting aqueous ammonical solution of copper salt with azo dye compound. No. 2,400,092. Norman Anderson to Allied Chemical & Dye Corp.

Making acid anthraquinone dyestuffs which comprises condensing a 1-amino-4-halogen-anthraquinone-2-sulfonate with ester of amino N-alkylated carbanilic acid in aqueous reaction mixture containing urea and copper condensation catalyst. No. 2,400,188. Curt Bamberger to Allied Chemical & Dye Corp.

Isodibenzanthrone vat dyestuff which is oxidation product of amino-isodibenzanthrone, which has been obtained by reacting amino-isodibenzanthrone with nitrous acid under acidic oxidizing conditions. No. 2,400,195. Maurice Fleysher to Allied Chemical & Dye Corp.

Equipment

Power-operated sediment tester. No. 2,400,154. Adam Lang to Langsenkamp Wheeler Brass Works, Inc.

Improving efficiency of filter for removing smoke, dust from gaseous medium, comprising providing suspension of spherical solid particles of liquefiable substance which is normally solid, and which possesses low vapor pressure, and passing suspension through filter to deposit particles in its pores. No. 2,400,179. Emerson Venable to Mine Safety Appliances Co.

Air-purifying element comprising two sheets of filter material disposed face to face with their body portions spaced apart and their ends sealed together, said sheets being wound spirally upon themselves. No. 2,400,180. Emerson Venable to Mine Safety Appliances Co.

Acid level indicator and electrolyte condenser for storage batteries constructed to be secured in filling opening of cell of storage battery, comprising hollow plug, transparent dome at top of plug, indicator shaft extending longitudinally, a float, etc. No. 2,400,228. Roscoe Franz and Robert Franz.

Means for dispensing liquids having low boiling points, comprising receptacle for liquid, having neck, nozzle element provided with capillary delivery outlet and having flange extending outwardly therefrom. No. 2,400,231. Charles Gebauer and Charles Bates to The Gebauer Chemicals Co.

Regenerative furnace. No. 2,400,300. Kurt Gehring and Sebren Puryear to Carnegie-Illinois Steel Corp.

Oil bath air filter. No. 2,400,347. Alfred Goodloe to Metal Textile Corp.

System for indicating quantity of material in container, a diaphragm capsule, a sealed enclosure within which said capsule is disposed, means for establishing within enclosure the initial pressure within container, means for inserting measured quantity of fluid into container to increase pressure therein, means for establishing increased pressure within diaphragm capsule to effect movement of diaphragm capsule in response to increased pressure. No. 2,400,411. Frederick Hauptman to Square D Co.

Apparatus for determining moisture content of a medium. No. 2,400,427. Charles Mabey to The Bristol Co.

Apparatus for simultaneously testing water-vapor permeability of two test specimens of sheet material comprising thin light-weight tube having open ends, said tube being of size and shape for accommodation on analytical balance. No. 2,400,481. George Brabender.

Apparatus for liquid treatment by formation and removal of sludge, comprising tank; means for maintaining liquid level in tank; annular partition upwardly extending from adjacent but above bottom to adjacent but below liquid level, and forming hollow pier in tank, etc. No. 2,400,598. Frank Prager to Graver Tank & Mfg. Co. Inc.

Liquid elevating apparatus comprising float chamber with suction and discharge branch, float in float chamber, ejector in connection with chamber, etc. No. 2,400,651. Gerald Marsh to Gresham & Craven Ltd.

Gas filter adapted to remove from gas suspended particles of ultramicroscopic dimensions, comprising filter casing having inlet and outlet openings, and filter element of rock wool arranged in casing. No. 2,400,719. Wilton Stackhouse to The United Gas Improvement Co.

Apparatus for contacting gas with liquid containing suspended solids comprising absorption tower containing as packing a plurality of deformable resilient bodies, said tower having rotating stirring means for agitating and temporarily deforming said bodies whereby deforming of resilient bodies breaks loose accretions adhering thereto, etc. No. 2,400,810. Lionel Willoughby Clarke and Brian Byrne to Imperial Chemical Industries Ltd.

Apparatus for detecting presence of a fluid and of type comprising variable resistance heated filament mounted within chamber. No. 2,400,923. Willard Farr and William Fagen to Stewart-Warner Corp.

Apparatus for detecting hydrogen in gases including, vessel evacuated of substantially all hydrogen and including envelope having tubular portion made of material permeable to hydrogen at elevated temperatures, means for heating portion, means for conducting gases through tubular portion whereby hydrogen present in gases passes into vessel, etc. No. 2,400,940. Henry McCollum; Thelma McCollum executrix of said **Henry McCollum, deceased.**

Distilling apparatus comprising conduit having vaporizer section and condenser section, barometric leg for each of said sections, etc. No. 2,400,947. John Pernert to Oldbury Electro-Chemical Co.

In device for concentrating fluid organic compounds by extraction methods, a vertical tower, plurality of spaced annular plates in engagement with inner surface of tower, a plurality of imperforate circular plates spaced from tower and alternating with annular plates, etc. No. 2,400,962. Robert Thompson to Celanese Corp. of America.

Apparatus for electrically resolving water-in-oil emulsions. No. 2,400,975. Paul Braceto Petrolite Corp. Ltd.

Apparatus for supplying sterilizing gas to a liquid to be sterilized, in combination a closed container, valve means for admitting gas into container at controlled pressure and capable of maintaining head of gas, etc. No. 2,401,012. Georg Ornstein.

Safety device for gas pressure responsive float operators. No. 2,401,046. Withe Briscoe.

Apparatus for determining surface tension of unknown liquid by method of maximum bubble pressure, comprising first vessel for containing unknown liquid provided with capillary tube, said tube extending downwardly in vessel and supported in fixed position relative to bottom and sides in vessel, etc. No. 2,401,053. Homer Cupples to the Secretary of Agriculture of the United States of America.

Liquid separator, comprising chamber having intake opening for liquid to be separated, discharge opening for lighter component of such liquid, and sump having drain opening for heavier component, said sump including wall rising above floor of chamber, etc. No. 2,401,067. Albert Granberg.

Centrifugal machine for separating gas from liquid. No. 2,401,079. Leo Jones and John Serrell to The Sharples Corp.

Testing gas for constituent thereof which comprises providing voltaic cell containing pair of electrodes one of which is inactive with respect to said constituent and other of which presents small surface of material reactive with constituent, and electrolyte acting as solvent for product of reaction between constituent and reactive electrode, alternately exposing portion of reactive electrode to gas and then submerging it in electrolyte, continuously measuring electromotive force, etc. No. 2,401,287. William Yant, Moses Jacobson, and John Strange to Mine Safety Appliances Co.

Refractoscope for comparing refractive index of fluid with that of solid material. No. 2,401,381. Gerald Willard to Bell Telephone Laboratories, Inc.

Apparatus for production of mirrored surfaces comprising high vacuum chamber for deposition of materials therein and periscope-like member attached thereto permitting continuous observation throughout deposition. No. 2,401,443. Arthur Weinrich to Libbey-Owens-Ford Glass Co.

Device for reducing foam comprising wall defining a chamber, means for rotating said chamber, fan blades rotatable with chamber for inducing flow of foam into chamber, means mounted in chamber and rotatable therewith for inducing coincidental rotation of foam and chamber whereby liquid component of foam is made sufficiently heavy by centrifugal force to crush foam bubbles. No. 2,401,469. Miles Lowell Edwards.

Gas-liquid contact device for effecting more intimate contact between gas and liquid which comprises housing; liquid-flow-producing means therein for producing plurality of sets of successive staggeredly positioned downwardly flowing sheet-like masses of liquid, means for directing plurality of upwardly flowing streams of gas horizontally into each of sheet-like masses of liquid, and individual perforate means against which each of mixtures is violently impelled to change its direction to the vertical. No. 2,401,569. Fred Koch.

Forming self-supporting flexible tank or lining. No. 2,401,626. Ernst Eger to United States Rubber Co.

Apparatus for evaporating liquid oxygen. No. 2,401,651. John Mathis and Roland Milan.

Explosives

Resinous combustible condensation product of 2,4,6-trinitrotoluene, formaldehyde, and member of group of ammonia and primary, strongly basic, N-methylol-forming, aliphatic and alicyclic amines. No. 2,400,806. Herman Bruson and George Butler to Rohm & Haas Co.

Food

Producing fat-soluble vitamin concentrates from oleaginous vitamin-containing materials which comprises saponifying oleaginous material to produce soap mass, extracting soap mass with solvent from hydrocarbons and halogenated hydrocarbons. No. 2,400,101. Loran Buxton to National Oil Products Co.

Canning soybeans in aqueous medium which comprises carrying out cooking in presence of acidic material to produce pH slightly less than but not greater than 6. No. 2,400,123. Arthur Levinson and Bernard Malter and Percy Julian to The Glidden Co.

Treating dried split peas, which comprises surface coating split pea surfaces with finely-divided talc and water mixture. No. 2,400,144. Leo Werts.

Dehydrating fruits and vegetables and juices of same by mixing proteins therewith, and then evaporating moisture. No. 2,400,460. Joseph Hall to Drying & Concentrating Co.

Extracting water from frozen food material which comprises supporting material on surface of heat-conducting member within chamber maintained under high vacuum, etc. No. 2,400,748. Earl Flosdorf to Lyophile-Cryochem Co.

Dehydrating rhubarb which consists in cooking rhubarb, adding sodium hydrogen carbonate thereto, and spreading rhubarb in thin layer for drying. No. 2,400,845. Huldah Shepard.

Treatment of vegetable and animal materials which includes washing, bruising them, subjecting them to extraction process, and during extraction subjecting them to influence of electric field and of tension which does not increase acidity. No. 2,400,951. Charles Reid.

Producing sterilized liquid food product which comprises: forcing liquid food material under pressure of 2,500 pounds per square inch through constriction and discharging material as fine atomized mist directly into sterilizing zone maintained at 100 pounds per square inch, etc. No. 2,401,077. Edward Johnston to Robert A. Johnston Co.

Preserving food products comprising pre-cooking food products in pressure-cookers until sterilized, etc., and subjecting filled and sealed packages of food products to ultra-violet light between 2,000 and 2,950 Angstrom units to sterilize contents. No. 2,401,131. Duryea Bensel to Bensel-Brice Corp.

Treating apple juice which comprises liming same and then forming readily separable lime precipitate in juice at temperature to prevent separation of lime-sucrose compounds with acidifying gas from carbon dioxide and sulphur dioxide and allowing precipitate to settle and removing. No. 2,401,169. Ray Laird.

Preparing stable fat-soluble vitamin-containing product in dry form which comprises admixing fat-soluble vitamin-containing fatty material with finely divided vegetable material having high affinity for fatty material, and mixing product thus obtained with crude vegetable oil. No. 2,401,293. Loran Buxton and Harry Konen to National Oil Products Co.

Dehydrating natural, fat-containing cheese, finely shredding fat-containing cheese, preliminarily effecting relative motion between drying gas and finely shredded particles of cheese, thereby drying and hardening surfaces of particles and entrapping fat within them. No. 2,401,320. George Sanders, dedicated to the free use of the People of the United States.

Inorganic

Preparing normal strontium chromate of fine particle size and freedom from ingredients harmful to use of chromate in metallic primers for protection of corrodible metals. No. 2,400,271. James Todd to Kentucky Color & Chemical Co.

Preparing normal barium chromate of fine particle size and freedom from ingredients harmful to use of chromate in metallic primers for protection of corrodible metals. No. 2,400,272. James Todd to Kentucky Color & Chemical Co.

Continuous carbonation of aqueous slurries of mixed hydrates of magnesium and calcium containing calcium chloride to produce aqueous magnesium chloride liquors containing suspended calcium carbonate. No. 2,400,360. Robert MacMullin and George Day to The Mathieson Alkali Works, Inc.

Treating freshly pressed silica hydrogel containing integral salt water solution, which comprises steaming hydrogel to about boiling point of water, and thereafter drying hydrogel. No. 2,400,907. Abraham Behrman to Infilco Inc.

Producing metal hydrides, which comprises heating charge of loose mixture of hydride-forming metal compound and aluminum, etc. No. 2,401,323. Peter Alexander to Metal Hydrides Inc.

Producing calcium hydride, which comprises feeding charge of magnesium and calcium oxide and stream of hydrogen to a reaction zone, etc. No. 2,401,326. Frederick Archibald and Peter Alexander to Metal Hydrides Inc.

Making from alkali metal peroxide a composition for removing carbon dioxide from gas containing it, method of rendering said peroxide reactive at subnormal temperatures which comprises mixing with peroxide an alkaline compound of lithium. No. 2,401,484. Carey Jackson to Mine Safety Appliances Co.

Formation of titanium tetrachloride from titanium oxide comprising chlorinating mixture of titanium oxide and material selected from titanium carbide and titanium cyanonitride in presence of reducing agent. No. 2,401,543. Paul Braillier to Stauffer Chemical Co.

Manufacture of silicon tetrachloride and titanium tetrachloride in shaft furnace preheated to temperature at which process proceeds. No. 2,401,544. Paul Brallier to Stauffer Chemical Co.

Manufacture of chlorine and sodium sulfate from sodium chloride and sulfur trioxide. No. 2,401,644. Ralph Iler to E. I. du Pont de Nemours & Co.

Medicinal

Medicinal preparation for injection into animal organism for treatment of calcium deficiency diseases, consisting of pure calcium salt of laevo-ascorbic acid mixed with anti-oxidation stabilizing agent. No. 2,400,171. Simon Ruskin to Frances Ruskin.

Metallurgy, Ores

Recovering nickel from nickeliferous lateritic ore containing serpentinic mineral and iron compounds. No. 2,400,098. Vas Hubert Brogdon to Nicaro Nickel Co.

Recovering residual nickel ammonium compounds and ammonia from reduced nickeliferous silicate ore tailings pulp obtained by leaching ore with ammoniacal leaching solution during aeration which comprises washing out nickel ammonium compounds with ammoniacal solution and gravity flowing washed ore tailing pulp countercurrent to steam. No. 2,400,114. Robert Hills to Nicaro Nickel Co.

Recovering nickel content from iron-bearing nickeliferous ores in oxidic state. No. 2,400,115. Robert Hills and Maurice Dufour to Nicaro Nickel Co.

Separating components of ores of class of non-sulfide non-silicate minerals admixed with silicous gangue and silicate minerals admixed with quartz and soluble potash minerals occurring in their soluble ores, which comprises admixing aqueous pulp of ore with collector from phosphorous acid amides and imides and their salts which contain functioning hydrocarbon group from aliphatic groups containing 7 or more carbon atoms, 5 of which are in single straight chain hydrocarbon groups present in abietic and naphthenic acids, etc. No. 2,400,213. Karl Schilling to Minerals Separation North American Corp.

Bladed hydraulic rotor made of alloy containing 3% to 6% nickel, 3% to 6% aluminum, 0.5% to 2.5% manganese, 5% to 30% zinc and balance copper, said alloy characterized by duplex microstructure comprising alphabeta structure. No. 2,400,234. Frank Hudson to The International Nickel Co., Inc.

Welding rod for welding manganese steel comprising manganese, 5% to 20%; copper and nickel together, 1% to 5%; boron, 0.001% to 0.1%; carbon, 0.1% to 2%; silicon, 0.1% to 2%; and balance iron. No. 2,400,249. Raymond Morrison to Morrison Railway Supply Corp.

Improving high temperature service life of chromium-containing heat-resisting alloys free from long-life elements which comprises providing alloys with adhering surface film of member selected from thorium, calcium, zirconium and the rare earth elements, oxides and hydroxides thereof and salts thereof. No. 2,400,255. Leonard Pfeil to The International Nickel Co., Inc.

Zinc base alloy containing 0.01 to 1.6% chromium, 0.05 to 1.5 cadmium, and rest zinc. No. 2,400,283. Edward Boyle and Edmund Anderson to The New Jersey Zinc Co.

Treating plain carbon and low-alloy hypoeutectoid steel containing .0005 to .005% boron and having normal structure including free ferrite to provide microscopically visible precipitate of boron constituent within steel's free ferrite. No. 2,400,302. Raymond Grange to United States Steel Corp. of Delaware.

Recovery of Nickel from nickeliferous lateritic serpentine ore by reduction of nickel content, process for facilitating such separation which comprises mixing with serpentine ore an addition of nickeliferous lateritic limonite ore prior to reduction, reducing iron content only to ferroso-ferric oxide state, and magnetizing oxide particles before settling operation. No. 2,400,461. Robert Hills to Nicaro Nickel Co.

Fine grain beryllium-copper base alloy capable of being cast and of work hardening, and having tensile strength comparable to steel, consisting of copper, beryllium, nickel, aluminum, arsenic, and to which mercury is added. No. 2,400,566. Charles Misfeldt.

Inhibiting blistering in heat treatment an alloy predominately of aluminum and containing alloying metals exclusively of iron except as impurity, which comprises immersing product in bath of caustic soda, whereby homogeneous dark coating is formed thereon, etc. No. 2,400,804. Charles Beneke to Reynolds Metals Co.

Production of impact resistant alloy steel articles of excellent surface and having particular resistance to corrosion and abrasion in presence of dilute acids and salt solutions and under electrolytic action, which includes, preparing machined articles from metal comprising chromium, nickel, molybdenum, carbon, and iron, and subjecting machined articles to precipitation-hardening treatment. No. 2,400,842. Henry Schaufus to The American Rolling Mill Co.

Manufacture of wire composed of alloy steel containing not more than 1.5% carbon and which hardens appreciably upon being rapidly cooled from temperature above its lower critical point, improvement which comprises heating rod of such alloy steel to above 900° F., and drawing rod through fixed die to effect large reduction of cross-sectional area. No. 2,400,866. Konstantin Kronwall to United Drill & Tool Corp.

Carbiding thoriated tungsten element comprising heating thoriated tungsten element to temperature between 2350° K. and 2550° K. in a carbiding gas consisting of inert gas and mixed therewith paraffinic hydrocarbon vapor. No. 2,400,893. Elmer Thurber and Leland Wooten to Bell Telephone Laboratories, Inc.

Treating steel strip which includes: hot-reducing sections of strip to gauge to finish within austenitic temperature range; passing finished sections, from reducing mill, toward coiler; quenching certain of sections to temperature hardening them to hardness requiring tempering; superimposing said sections upon another section of temperature permitting hardening by quenching, and coiling two sections together, etc. No. 2,400,931. Patrick Hume, William McGarrity and Edward Robinson to Carnegie-Illinois Steel Corp.

Treating steel strip. No. 2,400,932. Patrick Hume, William McGarrity and Edward Robinson to Carnegie-Illinois Steel Corp.

Separating antimony from impure dross containing antimony and lead which comprises, combining dross with ammonium halide, heating to distill antimony halide. No. 2,401,001. Thomas Jones to The American Metal Co. Ltd.

Producing ferrous metal ingots of killed metal, which comprises pouring killed metal into open-topped molds, providing hot top for each of molds, allowing metal to stand until major portion of non-metallic inclusions rise to top of metal, chilling metal adjacent to top portions, etc. No. 2,401,075. George Humes to Carnegie-Illinois Steel Corp.

Workable alloys containing 0.6 to 5% copper, 0.05 to 0.25% silver, and 0.1 to 0.75% antimony, balance being zinc. No. 2,401,135. Edward Bunn to Revere Copper & Brass Inc.

Hot and cold workable alloys of high tensile strength, ductility and toughness, characterized by high stability in respect to such properties and by high dimensional stability, which contain 0.2 to 5% copper, 0.05 to 0.25% silver, 0.1 to 0.75% phosphorus, balance being zinc. No. 2,401,136. Edward Bunn to Revere Copper & Brass Inc.

Extracting iron or iron alloys, consisting in heating material containing iron mixed with reducing carbon in successive charges in rotary furnace by direct action of furnace gases until iron alloys are melted, employing in second furnace containing limestone the gases flowing out of reduction furnace to heat limestone in second furnace. No. 2,401,146. Fritz Eulenstein and Adolf Krus.

Impregnating porous iron articles with copper, steps of: providing porous iron part made from briquetted iron powder, immersing part in molten copper, which has sufficient iron dissolved therein to satisfy dissolving action of copper on iron. No. 2,401,221. Robert Bourne to General Motors Corp.

Treating rhodium plating solution to maintain high reflectivity of rhodium coatings electrodeposited therefrom, which consists in removing from plating solution, when reflectivity of coatings tends to diminish, zinc and like base metals, by adding to plating solution a solution of potassium ferrocyanide in slight excess. No. 2,401,331. Abner Brenner and Walter Olson to the Secretary of Commerce of the United States of America.

Nickel plating bath comprising water solution of nickel sulfate, nickel chloride and boric acid, containing as organic brightening agent a mixture of polysulfonates of isomeric biphenyl benzenes. No. 2,401,428. Milton Kosmin to Monsanto Chemical Co.

Increasing high temperature creep strength of alloy containing chromium from 12% to 22%, nickel from 10% to 30%, molybdenum, tungsten and columbium each from 2% to 6%, carbon from 0.20% to 0.60% with remainder iron. No. 2,401,580. Gunther Mohling to Allegheny Ludlum Steel Corp.

Organic

Tetrahydrofurfuryl thiocyanoacetate. No. 2,400,095. Joseph Borglin to Hercules Powder Co.

Production of member from citric acid and its salts, comprising fermentation of aqueous carbonhydrate substrate containing nutrient inorganic and nitrogen-containing materials by surface aerobic growth of Aspergillus wentii, in presence of iron and zinc salts. No. 2,400,143. Selman Waksman to Merck & Co. Inc.

Nitrating material capable of being nitrated by replacement of hydrogen with nitro group, which comprises treating with nitrogen pentoxide dissolved in non-aqueous solvent, and contemporaneously bringing solution into contact with phosphorus pentoxide to regenerate nitrogen pentoxide. No. 2,400,287. George Caesar to Stein, Hall & Co. Inc.

Nitrating ethyleneurea which comprises treating it with solution of nitrogen pentoxide dissolved in non-aqueous solvent. No. 2,400,288. George Caesar and Max Goldfrank to Stein, Hall & Co. Inc.

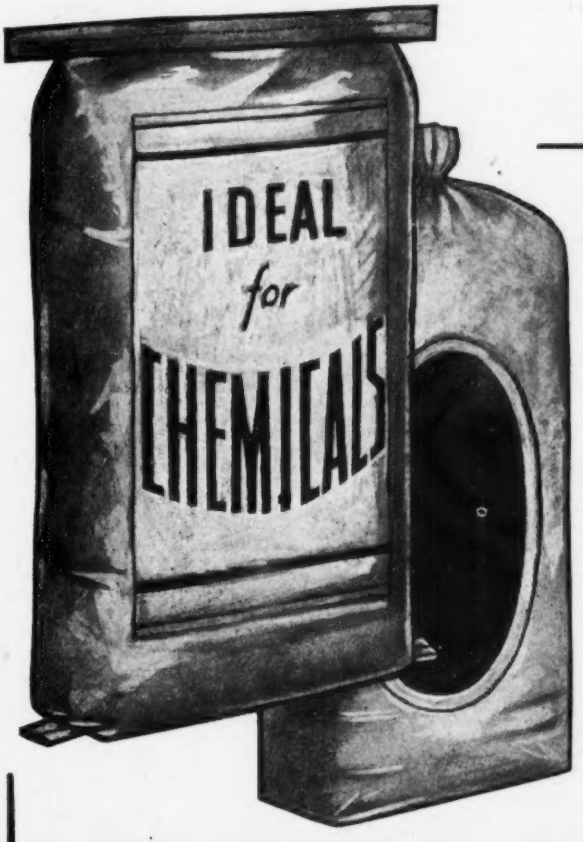
Manufacturing toluene, which comprises subjecting naphtha fraction to treatment with clay whereby olefins present are partly polymerized, etc. No. 2,400,355. Minor Jones and Frederick Schumacher to Standard Oil Development Co.

Producing toluene by reacting hydrocarbon feed stock boiling in presence of catalyst and hydrogen under such conditions that there is over-all net production of hydrogen. No. 2,400,363. Herbert Meier to Standard Oil Development Co.

Process and apparatus for producing in pure state, butyl alcohol, acetone, and ethyl alcohol from watery solutions. No. 2,400,370. Adolph Placek to Acme Coppersmithing & Machine Co.

Preparing a 3-oxy-delta^5-7-oxy-steroid. No. 2,400,380. Oskar Wintersteiner to E. R. Squibb & Sons.

Purifying tetraethyl lead containing sludge-forming bismuth compounds which comprises aerating tetraethyl lead with oxygen-containing gas. No. 2,400,383. William Bertolette and Alfred Parmelee to E. I. du Pont de Nemours & Co.



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Producing pyrazine which comprises vaporizing piperazine, passing vaporized material over catalytic mass comprising copper chromite. No. 2,400,398. James Dixon to American Cyanamid Co.

Dehydrating alcohols which comprises passing alcohol and substance selected from amines and imines in vapor phase over dehydration catalyst. No. 2,400,409. William Hale and Harry Miller to National Agrol Co. Inc.

Organic acids. No. 2,400,433. Samuel Natelson, Benjamin Kramer, and Ralph Tekel to Jewish Hospital of Brooklyn Research Foundation.

3,4-dihydroxytetrahydrothiophene. By 2,400,436. Wilbur Patterson and Joseph Karabinos to Wyeth Inc.

Alkylating unsaturated carbocyclic compounds with olefin hydrocarbons. No. 2,400,437. Myrle Perkins and Bernardus Sellmeyer to The M. W. Kellogg Co.

Producing trichloropropionic acid which comprises hydrolyzing trichloropropionitrile in sulfuric acid bath. No. 2,400,463. Joy Lichty to Wingfoot Corp.

Producing methyl-beta-chloroacrylate which comprises heating a dichloropropionic acid and methanol. No. 2,400,464. Joy Lichty to Wingfoot Corp.

Separation of higher phenols from wood distillate. No. 2,400,466. Alfred Reiter and Floyd Beman to Cliffs Dow Chemical Co.

N-(thiazyl-thio-methylene) urethanes. No. 2,400,469. Winfield Scott, deceased, by Ruth Scott, executrix to Wingfoot Corp.

Mixed calcium salts of alkyl phenol sulfides of which alkyl groups contain four to six carbon atoms and alkyl esters of salicylic acid of which alkyl groups contain six to eighteen carbon atoms. No. 2,400,492. Willard Finley and James Kirk to Sinclair Refining Co.

Condensing a 1,2-dihydroquinoline with a diarylamine in presence of acidic condensation catalyst selected from strong acids and hydrolyzable compounds of strong acids. No. 2,400,500. Carlin Gibbs to The B. F. Goodrich Co.

Substituted 1,3,5-triazinyl-(6)-amino-phenyl-arsenic compounds. No 2,400,547. Ernst Friedheim.

Diesters of phenyl-phosphonic acid. No. 2,400,577. Arthur Fon Toy to Victor Chemical Works.

Treating tall oil to separate fatty fraction which comprises esterifying fatty acids in tall oil with monohydric alcohol, hydrogenating fatty acid esters, decreasing temperature of resulting mass to effect precipitation of fatty acid esters. No. 2,400,607. Ernest Segressemann to National Oil Products Co.

Separation of toluene from complex mixture containing toluene and non-aromatic hydrocarbons of similar boiling point, improvement which comprises adding to mixture an aqueous solution of methanol, which is capable of forming constant boiling mixture with non-aromatics. No. 2,400,654. Theodor Petry and Herbert Holm to Socony-Vacuum Oil Co. Inc.

2-Amino-4:5-trimethylene-thiazole. No. 2,400,689. Hans Erlenmeyer to Ciba Pharmaceutical Products Inc.

Preparing branched-chain polyhydroxy compound wherein methylol groups are directly attached to carbon atom not containing hydrogen which comprises reacting formaldehyde and a saturated aliphatic aldehyde in presence of basic catalyst, and passing hydrogen into reaction mixture. No. 2,400,724. Joseph Walker to E. I. du Pont de Nemours & Co.

Production of beta, gamma-dimethyl allyl benzoate which comprises reacting tiglaldehyde dibenzoate with hydrogen in presence of Raney nickel catalyst. No. 2,400,727. Harry Yale to Shell Development Co.

Simultaneous production of styrene and butadiene which involves passing gaseous mixture of benzene and ethylene, through a reactor between 775° and 850° C., at a space velocity between 75 and 700 reciprocal hours. No. 2,400,774. Glenn Nesty and William Klingelhoefer to The Solvay Process Co.

Separating toluene from naphtha feed containing aromatic and non-aromatic hydrocarbons including olefins, paraffins, and naphthenes. No. 2,400,802. George Arnold to The Texas Co.

New complex compound alkalino-calco-alginate, having pH of at least 7. No. 2,400,834. Victor Le Gloahec to Algin Corp. of America.

Recovering glycerol from fermented liquors. No. 2,400,859. James Wallerstein, Eduard Farber and Victor Dayton to The Overly Biochemical Research Foundation, Inc.

1,3-diamino-5-alkylphenazinium salt. No. 2,400,872. Leslie Brooker and Homer Cressman to Eastman Kodak Co.

Acid-catalyzed addition-rearrangement product of dicyclopentadiene and hydroxycarboxylic acid ester, said product being dihydronordicyclopentadienyl ether of hydroxycarboxylic acid ester. No. 2,400,873. Herman Bruson to The Resinous Products & Chemical Co.

Isonitroso ketone-polyamino compound reaction product having general formula given in patent. No. 2,400,876. Morris Daskais and Ellis Field to Research Corp.

Producing by crystallization a benzene product of higher melting point by freezing from impurer highly refined benzene of fluctuating impurities-content. No. 2,400,883. William Keeling and William Glowacki to Koppers Co. Inc.

Preparing monoitroxylene low in dinitroxylene content, which comprises nitrating xylene with a sulfuric acid-nitric acid mixture, etc. No. 2,400,904. George Batchelder, Wesley Nagle, John Vyverberg and James Willis to E. I. du Pont de Nemours & Co.

Chemical compound having formula given in patent. No. 2,400,913. Alfred Burger to Smith, Kline & French Laboratories.

Obtaining purified 1-diethylamino-4-aminopentane from impure mixture which comprises treating mixture with carbon disulfide, to produce a 1-diethylamino-4-aminopentane dithiocarbamate, etc. No. 2,400,934. Reuben Jones to Eli Lilly & Co.

Catalyst capable of improving efficiency of liquid phase reactions for changing hydrogen content of carbonyl compounds, consisting of mixture of activated cuprous oxide easily wet by water, compound selected from alkaline earth metal oxides and alkaline earth metal hydroxides and stabilizing agent consisting of vanadium oxide. No. 2,400,959. Meredith Stewart to Iowa State College Research Foundation.

Oxyalkylated drastically-oxidized dehydrated ricinoleic acid compound. No. 2,401,055. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

N-(alpha-etherified-acetyl) carbamic acid esters. No. 2,401,080. Lowell Kilgore and Karl Weber to Kilgore Development Corp.

Distillation products of acylated shell liquids and method of making same. No. 2,401,095. Emil Novotny and George Vogelsang to Durite Plastics, Inc.

Preparation of terminally halogen substituted alkenes containing one to two units of a diene which comprises bringing member of aliphatic 1,3-dienes and sulfur dioxide adducts thereof in contact with polyhalogenated alkane of less than 3 carbon atoms having 2 halogens attached in presence of polyhydroxy benzene, a peroxygen compound, and iron. No. 2,401,099. Wesley Peterson to E. I. du Pont de Nemours & Co.

Higher molecular sulphamide compound containing cyanur nucleus having each of two carbon atoms connected to amino group of amino-benzene-aryl disulphimide, remaining carbon atom is connected to amino group of diamino-dibenzene disulphimide. No. 2,401,155. Winfrid Hentrich and Erik Schirm.

Dicarboxylic salts of polyhydroxy tertiary amines. No 2,401,196. Murray Senkus to Commercial Solvents Corp.

beta-Dimethylaminoethyl ester of benzilic acid and its acid addition salts. No. 2,401,219. Frederick Blicke to The Regents of the University of Michigan.

Direct production of anthraquinone selected from anthraquinone and substituted anthraquinone, from compound (A) selected from benzene and a halogen substituted benzene, and compound (B) selected from phthalic anhydride and a substituted phthalic anhydride; which comprises: forming vapor mixture of compound (A) and compound (B); and contacting vapor mixture with catalyst comprising association of silica and amphoteric metal oxide. No. 2,401,225. Philip Caesar and Alexander Sachanen to Socony-Vacuum Oil Co. Inc.

Preparation of N,N-diethylaminoethanethiol which comprises heating diethylamine with beta-chloroethyl thiolacetate. No. 2,401,234. Mark Farlow to E. I. du Pont de Nemours & Co.

1-Dialkylacetyl-5-substituted biurets. No. 2,401,244. Arthur Hill and William Degnan to American Cyanamid Co.

Producing p-cymene, using catalyst body consisting of member of CrO_3, Cr_2O_3 and mixtures of same, together with oxide selected from oxides of iron, cobalt and nickel, said oxides being supported on "activated alumina". No. 2,401,246. Washington Hull to American Cyanamid Co.

Esters of pentahalophenoxy-alkanols. No. 2,401,261. Clinton MacMullen to Rohm & Haas Co.

Preparation of nitrolic acids and pseudonitroles. No. 2,401,267. Edwin Nygaard to Socony-Vacuum Oil Co. Inc.

Production of nitrolic acids and psudonitroles. No. 2,401,268. Edwin Nygaard to Socony-Vacuum Oil Co. Inc.

Preparation of nitrolic acids and pseudonitroles. No. 2,401,269. Edwin Nygaard and Thomas Noland to Socony-Vacuum Oil Co. Inc.

Separating acetol acetate from mixture selected from acetic oil and acetic oil which has been freed of acidic ingredients by neutralization, which consists in fractionally distilling mixture, etc. No. 2,401,274. Alfred Reiter and Floyd Beman to Cliffs Dow Chemical Co.

Separating into its components a narrow-boiling-range mixture comprising cyclopentene and piperylene which comprises fractionally distilling mixture in presence of methanol to form azeotrope with cyclopentene in said mixture. No. 2,401,282. Charles Welling to Phillips Petroleum Co.

Recovery of diacetyl from pyroligneous oils, which comprises treating pyroligneous oil with acid catalyst and water, and distilling. No. 2,401,335. Douglas Calder and Kenneth Fleer to Forest Products Chemical Co.

Manufacture of Ketals and other derivatives of 1,2-diketones. No. 2,401,336. Douglas Calder and Kenneth Fleer to Forest Products Chemical Co.

Treatment of castor oil, steps of distillating castor oil in presence of distillation agent from clay, diatomaceous earth, aluminum hydrate, anhydrous silica and silica gel. No. 2,401,369. Adam Paluszek, fifteen per cent to James Hayes.

Producing novel chromiates having tanning properties which comprises reacting water-soluble dichromate with lignin sulfonic acid. No. 2,401,373. Edwin Robinson and Ralph Beach to National Oil Products Co.

Converting conjugated dienes containing less than about 7 carbon atoms to their dimers. No. 2,401,414. Thomas Doumani and Roland Deering to Union Oil Co. of California.

Pyrolyzing reaction product of ammonia and acrylonitrile, and thereby converting 2,2'-dicyanodiethylamine and 2,2',2"-tricyanotriethylamine to 2-cyanoethylamine. No. 2,401,429. Frederick Küng.

Hydrogenating acetylene in normally gaseous mixture comprising acetylene with free hydrogen and olefins without appreciable hydrogenation of olefins, which comprises contacting mixture with boro-silicate glass. No. 2,401,444. Charles Welling to Phillips Petroleum Co.

Producing novel chromiates having tanning properties which comprises reacting water-soluble dichromate with lignin sulfonic acid-formaldehyde condensation product. No. 2,401,508. Edwin Robinson and Ralph Beach to National Oil Products Co.

Manufacture of new aromatic carboxylic acid amide comprising condensing 2-acetoxybenzoylchloride with 2-aminothiazol. No. 2,401,522. Arthur Stoll and Julius Peyer to Sandoz Ltd.

Introducing amino group into aromatic compound including homocyclic ring containing hydrogen atom attached to one of carbon atoms, which comprises heating aromatic compound in strong sulphuric acid with paraffin containing nitro group, solution containing dissolved salt of iron or vanadium. No. 2,401,525. Jozef Szczesny Turski.

Producing beta-alanine by catalytic reduction of cyanoacetic acid, improvement which comprises slowly adding acetic acid solution of cyanoacetic acid to suspension of hydrogenation catalyst in acetic acid while effecting reduction of cyanoacetic acid to beta-alanine by introduction of hydrogen. No. 2,401,547. Gustaf Carlson to Lederle Laboratories, Inc.

Unsaturated carbamate and polymers thereof. No. 2,401,549. Albert Chenicek to Pittsburgh Plate Glass Co.

Unsaturated esters and polymers thereof. No. 2,401,581. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Preparing acyl biurets which comprises member of acyl dicyandiamides and acyl guanylureas with acid having dissociation constant of 1×10^{-4} in presence of water. No. 2,401,599. Pierrepont Adams to American Cyanamid Co.

beta-Cyanoalkyl ethers of polyhydric alcohols. No. 2,401,607. Herman Bruson to The Resinous Products & Chemical Co.

Production of monohydric phenols having methyl groups in positions other than *m*-position with respect to phenolic hydroxyl group, comprising dry distilling in presence of alkali from alkaline earth metal oxides and hydroxides, phenolic aryl compounds having 1 to 3 groups of type $-CH_2X$, wherein X is selected from hydroxyl and groups capable of being converted to hydroxyl. No. 2,401,608. Abraham Burawoy to The Calico Printers' Association Ltd.

Removing solid materials from oil solution of alkaline earth metal sulphonate having poor filtering characteristics, which comprises mixing with solution an organic solvent from aliphatic alcohols, glycols, and glycol ethers to lower viscosity of solution, and filtering. No. 2,401,614. Vladimir Chechot and Llewellyn Howe to The Atlantic Refining Co.

Producing water-insoluble hydrophobic, chromic-protein products, comprising dissolving prolamine and water-soluble chromic salt in mutual solvent and thereafter removing solvent from solution. No. 2,401,645. Ralph Iler to E. I. du Pont de Nemours & Co.

Compound having general formula described in patent. No. 2,401,658. Philip Paul to United States Rubber Co.

Paints, Pigments

Paint product in paste form consisting of oleaginous film forming material of drying type, the reaction product of aliphatic fatty acid of 12 to 24 inclusive carbon atoms and volatile alkaline reacting material, coal tar solvent, and pigment-fillers, said paste being dispersible in either water or common commercial organic paint solvents. No. 2,401,666. Marvin Schmidt to United States Gypsum Co.

Paper and Pulp

Conducting paper comprising fibrous body containing mixture of finely divided metal particles and stearic acid ester of diethylene glycol dispersed throughout fibrous body, said ester promoting conductive intimacy of metal particles. No. 2,400,544. Bernard Kline and Curt Mobius to The Western Union Telegraph Co.

Petroleum

Bituminous composition comprising concentrated residuum from cracking of petroleum hydrocarbon cracking stock derived from non-asphaltic base crude oils. No. 2,400,067. Joseph Best and Ralph Traxler and Herbert Schweyer to The Texas Co.

Manufacture of naphtha hydrocarbons which comprises maintaining in reaction zone a stationary mass of cracking catalyst consisting of acid-treated Doucil (Doucil being synthetic gel having composition Na_2O, Al_2O_3, $5SiO_2$) impregnated with nickel, passing feed oil vapors through mass, etc. No. 2,400,075. Walter Claussen to The Texas Co.

Isomerizing normal butane to produce isobutane. No. 2,400,090. Robert Henry to Phillips Petroleum Co.

Acid treating oil which comprises: contacting viscous hydrocarbon oil with concentrated sulphuric acid to cause acid to react with unstable constituents of oil to form oil-soluble sulphonation products and oil-insoluble acid sludge, etc. No. 2,400,298. Benjamin Jones and Leslie Sharp to Tide Water Associated Oil Co.

Separating olefins from predominately C_4 hydrocarbon feed stock comprising olefins including contacting feed stock with sulfuric acid under conditions to form extract, washing extract with naphthenic acid to remove foaming agents, heating washed extract to cause vaporization of hydrocarbons from extract. No. 2,400,340. John Cone to Standard Oil Development Co.

Recovering normal butylenes from C_4 fraction containing them in admixture with isobutylene and butanes. No. 2,400,350. Ike Hall to Standard Oil Development Co.

Reacting olefins with isoparaffins. No. 2,400,367. Karl Opryshek and John Chatfield to Standard Oil Development Co.

Treating hydrocarbon oil comprising toluene and olefins. No. 2,400,373. Henry Schutze to Standard Oil Development Co.

Recovering olefin from predominately C_4 hydrocarbon feed stock comprising olefins involving contacting feed stock with sulfuric acid, step of adding oil soluble sulfonic acids to circulating sulfuric acid stream to eliminate foam in regeneration zone. No. 2,400,376. Jere Showalter to Standard Oil Development Co.

Alkylation of butenes and isobutane with body of liquid hydrofluoric acid. No. 2,400,386. John Bolinger, Andrew Brumbaugh and James Curtis to Socony-Vacuum Oil Co. Inc.

Breaking petroleum emulsions of water-in-oil type, characterized by subjecting emulsion to demulsifier comprising member of (A) substituted carbamyl compounds containing at least 2 glyoxaldine radicals; and (B) oxyalkylated derivatives of aforementioned carbamyl compounds. No. 2,400,394. Melvin De Groote Bernhard Keiser to Petrolite Corp. Ltd.

Preventing water-in-oil type emulsions resulting from acidization of calcareous, oil-bearing strata, which consists of introducing into cognate fluids of well, water-soluble member of class of: (A) substituted carbamyl compounds containing at least 2 glyoxalidine radicals; and (B) oxyalkylated derivatives of aforementioned carbamyl compounds. No. 2,400,395. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Geochemical exploration for subterranean petroliferous deposits which comprises collecting samples of soil at spaced points in area to be investigated, subjecting individual samples to analysis for determination of content thereof of a selected alkaline-earth metal and correlating values determined with sample locations. No. 2,400,420. Leo Horvitz.

Production of normally gaseous hydrocarbon products and normally liquid hydrocarbon products of nature of gasoline from hydrocarbon oils containing nitrogen compounds by cracking with clay-type catalysts. No. 2,400,431. George Montgomery and Rulon McOmie to Shell Development Co.

In catalytic cracking and reforming hydrocarbons to produce high octane gasoline hydrocarbons, method which comprises bringing hydrocarbons into contact with solid catalyst free of sodium and potassium and comprises aluminum fluoride hemi-hydrate in association with adsorbent material. No. 2,400,446. Preston Veltman to The Texas Co.

Catalytic conversion of hydrocarbons. No. 2,400,465. Milton Marisic to Socony-Vacuum Oil Co. Inc.

Treating crude oil which consists in heating oil to 110° F., then mixing hydrated lime and water so that it will readily flow, adding mixture to oil, adding chlorine acid to mass, and agitating mass. No. 2,400,515. Floyd Kent and Clarence Patrick.

Catalytic vapor phase conversion of hydrocarbons in presence of anhydrous aluminum chloride, steps of recovering aluminum chloride vapors from reaction product vapors. No. 2,400,669. Utah Tsao to The Lummus Co.

Process and apparatus for demulsification of hydrocarbons. No. 2,400,713. William Rhees.

Manufacture of gasoline from naphtha hydrocarbon mixture containing aromatic naphthenic and paraffinic hydrocarbons. No. 2,400,732. George Arnold to The Texas Co.

Preparing gasoline rich in aromatic hydrocarbons and saturated aliphatic hydrocarbons from virgin naphtha and cracked naphtha involving dehydrogenation of hydrocarbon constituents of straight-run naphtha and hydrogenation of hydrocarbon constituents of cracked naphtha concurrently in same reaction zone. No. 2,400,795. Claude Watson to The Texas Co.

Fuel for Diesel engines or oil burners which consists of hydrocarbon fuel oil constituents and tetraethyl lead. No. 2,400,915. John Campbell to General Motors Corp.

Increasing yield of high antiknock aviation gasoline stocks from light paraffinic hydrocarbons. No. 2,400,922. Bernard Evering and Edmond d'Ouville to Standard Oil Co.

Desalting crude petroleum oil containing inorganic chlorides selected from alkali metal chlorides and alkaline earth chlorides comprising contacting crude oil with liquid anhydrous hydrogen fluoride. No. 2,400,985. Bernard Evering and Arthur Lien to Standard Oil Co.

Removing water and inorganic salts from crude oil comprising contacting crude oil with hydrogen fluoride-water mixture containing not more than 50% HF, separating oil phase, and aqueous phase. No. 2,400,986. Vanderveer Voorhess to Standard Oil Co.

Well screen comprising apertured fluid passing medium, and solid oil and water insoluble material closing apertures of medium, comprising metallic carbonate readily attackable by acid to disintegrate material and open screen apertures and binding substance tending in water to expand material within apertures. No. 2,401,035. Swan Akeyson and Ward Stockham to Nobs Chemical Co.

Plastic oxy-aromatic petroleum wax and method of making same, which comprises effecting formation of plastic body containing combined halogen by heating chlorinated petroleum wax with oxy-aromatic material, selected from phenol, the naphthols, and diphenyl ether in presence of Friedel-Crafts catalyst and thereafter dechlorinating body. No. 2,401,104. Orland Reiff and John Zech to Socony-Vacuum Oil Co. Inc.

Separation of low-boiling diolefins from hydrocarbon mixtures containing same and close-boiling non-diolefinic hydrocarbons which comprises passing mixture through bed of solid cuprous halide reagent which is permeable cohesive mechanical mixture consisting of dry powdered cuprous halide distributed in particulate form on inert non-adsorbent non-hygroscopic fibrous carrier, etc. No. 2,401,114. Walter Schulze and Graham Short to Phillips Petroleum Co.

Isomerizing saturated hydrocarbons which comprises contacting hydrocarbons with sludge-forming metal halide isomerization catalyst of Friedel-Crafts type, and then contacting total hydrocarbon effluents from contacting step with catalyst consisting of active metal halide sludge formed in said step to obtain further isomerization. No. 2,401,242. Karl Hachmuth and David Blaker to Phillips Petroleum Co.

Aromatizing sulphur-containing hydrocarbons, which comprises preheating and simultaneously desulphurizing naphtha by contacting with spent catalyst of co-precipitated gel type chromium oxide, and finally aromatizing naphtha by contacting with active catalyst of co-precipitated gel type chromium oxide and aluminum oxide. No. 2,401,334. Robert Burk and Everett Hughes to The Standard Oil Co.

Treating hydrocarbons comprising charging petroleum fraction in gas oil boiling range to catalytic cracking unit, etc. No. 2,401,363. Herbert Meier to Standard Oil Development Co.

Reducing olefin content of olefinic distillate boiling in gasoline range which comprises subjecting distillate to action of catalyst comprising precipitated silica and precipitated alumina. No. 2,401,636. Vladimir Haensel and Vladimir Ipatieff to Universal Oil Products Co.

Converting non-aromatic hydrocarbon oil to form product rich in low-boiling aromatics and low in olefins. No. 2,401,649. **Friedrich Leffer,** naturalized as Frederick Leffer, to Universal Oil Products Co.

Removal of hydrogen halides from hydrocarbon conversion products. No. 2,401,678. Gordon Zimmerman to Universal Oil Products Co.

Photographic

Photographic sheet material comprising transparent layer, light diffusing layer and between the two, porous, fibrous layer adhering to both of other layers, thickness of porous layer being between .00005 inch and .005 inch. No. 2,400,346. Courtney Glassey to Eastman Kodak Co.

Thin supporting layer for photographic records comprising three transparent smooth surfaced pellicles attached to each other only at distributed areas of contact, each of two intervening airspaces having thickness greater than .00005 inch and total thickness of layer being less than .005 inch. No. 2,400,365. Alexander Murray to Eastman Kodak Co.

Thin supporting layer for photographic records which comprises light diffusing layer, transparent pellicle attached to layer only at distributed areas of contact and each less than one twentieth of an inch wide. No. 2,400,366. Alexander Murray to Eastman Kodak Co.

Photographic element comprising support bearing a light-sensitive silver halide layer having hydro-tropic agent in contact therewith, and layer containing polyoxyalkylene ether of ring-dehydration product of hexitol in contact with said silver halide layer. No. 2,400,532. Ralph Blake and Walter Baldsiefen to E. I. du Pont de Nemours & Co.

Photographic element which comprises support having surface of fully esterified methyl methacrylate polymer, substratum layer adjacent thereto and having methyl methacrylate polymer containing 15 to 25% free carboxyl groups, and gelatino layer adjacent to substratum layer. No. 2,400,989. John Hart and Edward Lee to Ilford Ltd.

Producing direct positive emulsion. No. 2,401,051. George Crouse, Francis Holt, and Jacob Jatlow to Photo-Positive Corp.

Producing positive sound track in multi-layer photographic film having emulsion layers sensitive respectively to different regions of visible spectrum of which area is suitable for sound track recording and another area for picture recording. No. 2,401,699. Leopold Mannes to Eastman Kodak Co.

Preventing formation of color fog in photographic silver halide emulsion which contains non-diffusing coupler therein, comprising developing emulsion after exposure with primary aromatic amino developing agent in presence of ascorbic acid. No. 2,401,713. Paul Vittum and Lot Wilder to Eastman Kodak Co.

Increasing concentration of coupler compound in color-forming photographic emulsion, which comprises forming insoluble metallic salt of coupler compound selected from compounds containing imino, mercapto and acyl-substituted mercapto groups, in silver halide emulsion in presence of amino compound from aliphatic amines and amino acids. No. 2,401,718. Richard Young to Eastman Kodak Co.

Polymers

Obtaining porous articles of polytetrafluoroethylene. No. 2,400,091. Johannes Alfthan to E. I. du Pont de Nemours & Co.

Molding polytetrafluoroethylene. No. 2,400,094. Anthony Benning and William Markwood, Jr. to E. I. du Pont de Nemours & Co.

Obtaining articles of polytetrafluoroethylene. No. 2,400,099. Merlin Brubaker and William Hanford to E. I. du Pont de Nemours & Co.

Low temperature polymerization process, the steps of chilling carbon-disulfide to -10° C. to -150° C., dissolving therein isobutylene and a conjugated diolefin having carbon atom content within 4 to 12 inclusive, adding Friedel-Crafts catalyst and polymerizing to dissolved polymer having molecular weight within 15,000 to 250,000. No. 2,400,129. Joseph Nelson and Augustus Small to Standard Oil Development Co.

Laminated glass comprising two sheets of glass having therebetween flexible tough transparent interlayer of polymer which is obtained by polymerizing ethylene with vinyl polymer containing 12 to 50 mols of ethylene per mol of ionyl acetate. No. 2,400,139. John Roland to E. I. du Pont de Nemours & Co.

Shaped article comprising direct deposit of solids of aqueous dispersion

of copolymer produced from mixture of butadiene and styrene, said dispersion containing separately polymerized thermoplastic polyterpene hydrocarbon resin. No. 2,400,164. Charles Peaker to United States Rubber Co.

Rope strand including plurality of elements laid spirally together, one of elements comprising length of synthetic organic polymer oriented along spiral lines parallel with longitudinal center line of helix in which element is set. No. 2,400,181. Richard Warren, Jr.

Composition comprising polyvinyl acetal and glycidyl ether of glycerol. No. 2,400,333. Franklin Bent and Kenneth Marple to Shell Development Co.

Laminated sheet of rubber hydrochloride film, one ply of which is rubber hydrochloride and contains no iodine and other of which is rubber hydrochloride which contains iodine carrier and contains iodine readily liberated. No. 2,400,389. Chester Cavallito Wingfoot Corp.

New composition, consisting of member of class of oxyalkylated lower alkyl esters of polymerized polyethylenic higher fatty acid and oxyalkylated sulfurized lower alkyl esters of polymerized polyethylenic higher fatty acid. No. 2,400,393. Melvin De Groote to Petrolite Corp. Ltd.

Polymerizing maltose, which comprises heating crystalline maltose in form of fairly large crystals, under anhydrous conditions, and at polymerizing temperature, in contact with catalytic material comprising pulverulent, non-alkaline boron compound containing B_2O_3. No. 2,400,423. Gerald Leuck to Corn Products Refining Co.

Adhesive which comprises olefin polysulphide rubber and organic diisocyanate, said olefin polysulphide rubber being reaction product of alkylene dihalide and alkali metal polysulphide. No. 2,400,474. Theodore Ten Broeck to Wingfoot Corp.

Polymerizing alkyl acrylates which comprises agitating mixture of alkyl acrylate monomer and polymer of said alkyl acrylate. No. 2,400,477. Francis Atwood to National Dairy Products Corp.

Conjunct polymerization of propylene to produce saturated hydrocarbon polymers and terpene-like unsaturated hydrocarbons which comprises contacting mono-olefin with catalyst consisting of hydrofluoric acid, etc. No. 2,400,520. Carl Kuhn, Jr. to Socony-Vacuum Oil Co. Inc.

Conjunct polymerization of olefin of more than 3 carbon atoms to produce saturated hydrocarbon polymers and terpene-like unsaturated hydrocarbons which comprises contacting monoolefin with catalyst consisting of hydrofluoric acid. No. 2,400,521. Carl Kuhn, Jr. to Socony-Vacuum Oil Co. Inc.

Production of polymerized olefins, etc., improvement which comprises returning portion of said composite lean gaseous product to catalyzing operation, whereby predetermined concentration of higher olefins is maintained in catalyzing operation. No. 2,400,621. Joseph Alther to Universal Oil Products Co.

Preparation of certain reactive phenol-aldehyde resins and their use as modifying agents for rosin which comprises reacting unmodified phenol and aldehyde in two successive steps: (1) forming a Novolak in acid medium using phenol but only part of aldehyde, and (2) condensing further intermediate Novolak with aqueous formaldehyde in medium of strong alkali. No. 2,400,718. Ernst Siegel to Reichhold Chemicals, Inc.

Producing hydrophilic surface on object made from hydrophobic polymer containing aromatic nuclei which comprises treating surface with member of group of conc. sulphuric acid, fuming sulphuric acid, sulphur trioxide and chlorsulphonic acid. No. 2,400,720. Hanns Staudinger and Henry Hutchinson to The Distillers Co. Ltd.

Preparing aqueous dispersion of a vinyl chloride polymer which is free from OH groups comprising mixing with said polymer a vinyl chloride polymer which contains OH groups, a plasticizer and hydrophilic colloidal dispersing agent, and adding water to plasticized mass until inversion of phase takes place and polymer particles become dispersed in aqueous medium. No. 2,400,808. Edward Burns to Dispersions Process, Inc.

Plastic composition comprising resinous polymer of compound selected from styrene and nuclear substituted methyl styrene and plasticizing agent selected from cyclohexyl naphthenate and cyclohexyl stearate. No. 2,400,892. Frank Soday to The United Gas Improvement Co.

Preparing polyvinyl acetal resin by condensation reaction of aldehyde containing 2 to 4 carbon atoms with polyvinyl alcohol containing up to 30% of unhydrolyzed polyvinyl ester in predonderantly water solution. No. 2,400,957. Gelu Stamatoff to E. I. du Pont de Nemours & Co.

Preparation of synthetic resinous products insoluble in benzole from phenol, formaldehyde and oxidised rubber. No. 2,401,102. Frederick Popham to The British Rubber Producers' Research Association.

Producing chlorinated rubber containing 62 to 70% chlorine and by high initial and permanent flexibility when an unplasticized film. No. 2,401,133. Frederic Bouchard to Hercules Powder Co.

Producing chlorinated rubber containing 62 to about 70% chlorine and by high initial and permanent flexibility when an unplasticized film. No. 2,401,194. Edwin Schlenk to Hercules Powder Co.

Low power factor electrical insulating composition, solid at ordinary atmospheric temperature and readily extrudable by manual pressure at 120° C., that comprises mixture of polymerized styrene having molecular weight of 80,000 and polymerized alpha methyl styrene. No. 2,401,266. Archibald New to International Standard Electric Corp.

Polymerizing a butadiene-1,3 hydrocarbon in presence of mixture of xanthogen compound. No. 2,401,346. Charles Fryling to The B. F. Goodrich Co.

Molding composition comprising finely sub-divided ion exchange compound of base exchange finely divided solid and ionizable salt of a polymerizable olefinic carboxylic acid. No. 2,401,348. Ernst Hauser and Eli Dannenberg to Research Corp.

Polymerizing vinyl acetate which comprises heating under agitation a mixture of vinyl acetate monomer, water as vehicle, peroxide polymerization catalyst, water-soluble alkaline substance to maintain pH between 4.9 and 3.8, and as a dispersing agent, a starch. No. 2,401,445. Jesse White to E. I. du Pont de Nemours & Co.

Manufacturing bubble-free shapes of cross-sectional dimensions from extrudable synthetic organic thermoplastic material which comprises extruding thermoplastic material under heat and pressure through die into pressure chamber containing fluid under superatmospheric pressure, maintaining pressure on extruded shape while cooling. No. 2,401,642. James Hiltner and William Berlinghof, Jr. to Rohm & Haas Co.

Processes and Methods

Obtaining temperature control in continuous catalytic conversion system which comprises admixing with catalyst dense non-combustible heat retention material of high specific heat having particle size about same as that of catalyst material and being inert toward catalytic reaction. No. 2,400,176. Ernest Thiele to Standard Oil Co.

Reacting fluid in contact with mass of subdivided solid particles which comprises maintaining continuous compact bed of solid particles within confined reaction zone from adjacent its upper extremity to its lower extremity, causing particles of bed to move downwardly through reaction zone by continuously supplying particles to upper portion of bed and continuously removing particles from lower portion. No. 2,400,194. Roland Day and Elmer Kanhofer to Universal Oil Products Co.

Solvent-treating liquid mixture of components selectively to dissolve out of mixture at least one component thereof. No. 2,400,378. Daniel Stines to Standard Oil Development Co.

Analysis of mixture containing plurality of components involving comparison of measurements of quantities of ions of predetermined mass-to-charge ratios formed in mass spectrometer from mixture and from reference samples including different proportions of components under same ionization conditions, the improvement which comprises separately ionizing said mixture at different ionization voltages at which ions of one such mass-to-charge ratio are formed in different proportions from respective components. No. 2,400,557. Reed Lawlor to Consolidated Engineering Corp.

Separating solid particles from stream of vaporous fluid which comprises passing stream through separation zone wherein large particles are separated, classifying large solid particles as to size and directing different size particles into different portions of filter zone, etc. No. 2,400,644. Benjamin Hoffman.

Recovering catalyst comprising boron trifluoride from hydrocarbon containing phase with which catalyst is admixed, which comprises passing hydrocarbon and catalyst through absorbing zone in contact with dimethylaniline, etc. No. 2,400,874. Robert Burk to The Standard Oil Co.

Recovering catalyst comprising boron trifluoride, from hydrocarbon containing phase, which comprises passing hydrocarbon and catalyst through absorbing zone in contact with diphenylamine, etc. No. 2,400,875. Everett Hughes and John Bartleson to The Standard Oil Co.

Separating solids and other deleterious matter from fluids comprising passing contaminated fluid through adjacent rows of well defined juxtaposed and restricted channels, one row of channels being separated from adjacent row by filtering wall composed of interlaced cellulosic fibers, and passing fluid in contact with adsorbent material as it passes through row of channels. No. 2,401,222. Southwick Briggs.

Removing impurities from fatty substance of vegetable oils and waxes to restore said fatty substance to normal composition. No. 2,401,338. Russell Dunmire to Buckeye Laboratories Corp.

Removing impurities from used fatty substance of animal oils and waxes, which comprises mechanically mixing and agitating fatty substance and solid adsorbent material in sealed container to adsorb high boiling point impurities, etc. No. 2,401,339. Russell Dunmire to Buckeye Laboratories Corp.

In operation of rolling mills where supply of water and fatty oil are caused to flow over and about material being treated in mill and producing contaminated water and oil sludge, process of recovering and purifying oil for recurrent use, comprising re-refining separated oil sludge by mechanically mixing and agitating separated oil sludge with solid adsorbent material in sealed container to adsorb high boiling point impurities, etc. No. 2,401,340. Russell Dunmire and James Camelford to Buckeye Laboratories Corp.

Removing impurities from contaminated compounded oil of mineral oils compounded with oil-soluble additive substance. No. 2,401,341. Russell Dunmire to Buckeye Laboratories Corp.

Testing supposedly sealed container for leakage, comprising, positioning container within closed system of definite initial volume and filled with gas at definite initial pressure, changing initial volume by definite volume to thereby change initial pressure, and measuring resulting change in initial pressure as criterion of perforate or imperforate condition of container. No. 2,401,368. Robert O'Connell, Irving Cohen and Carl Rosenblum.

Detection of sulphur impurities in coal which comprises subjecting coal to near ultra-violet light whereby such impurities will produce visible orange fluorescence. No. 2,401,410. Walter Brown.

Rubber

Producing fluid-tight winding for magnetizable core having slots therethrough, comprising coating copper wire with metal of class of zinc, lead cadmium, tin, antimony, and alloys to which electrophoretically deposited rubber will readily adhere, etc. No. 2,400,576. Frank Sigmund and William Hlavin to Sigmund Corp.

Preparing synthetic rubberlike materials which comprises polymerizing mixture of compound selected from styrene and methyl substituted styrenes with mixture of isoprene with butadiene-1,3. No. 2,400,578. Byron Vanderbilt and Harold Rose to Standard Oil Development Co.

Preparing rubber deposit which comprises associating aqueous dispersion of rubber comprising positively charged particles stabilized with cationic soap and containing added coagulating chemical which coagulates only negatively charged particles with second rubber dispersion comprising negatively charged particles stabilized with anionic soap and containing added coagulating chemical which coagulates only positively charged particles. No. 2,401,027. Harry Tausch to American Anode, Inc.

Vulcanization accelerators consisting of tetraethyl thiuram disulfide and tetraethyl thiuram monosulfide. No. 2,401,519. Albert Somerville to R. T. Vanderbilt Co. Inc.

Specialties

Compounded oil comprising oil of lubricating viscosity and salt of a thiocarbamic acid and aliphatic selenide selected from aliphatic monoselenides and aliphatic polyselenides. No. 2,400,106. George Denison, Jr. and Paul Condit to California Research Corp.

Insecticide and insect-repellent, comprising alkaloids of plants of genus Ryania and a carrier therefor. No. 2,400,295. Karl Folkers, Edward Rogers, and Ralph Heal to Merck & Co. Inc.

Non-congealing starch preparation comprising insoluble starch and alkylolamine soap. No. 2,400,402. James Evans to General Mills, Inc.

Series of bright finish salt baths, a No. 1 bath adapted to operate at 1350° F. to 1700° F. and comprising potassium chloride, sodium chloride, and sodium fluoride; a No. 2 bath adapted to operate at 500° F. to 700° F. and comprising potassium chloride, sodium chloride, sodium fluoride, and zinc chloride, and a No. 3 bath adapted to operate at 700° F. to 1100° F. and comprising potassium chloride, sodium chloride, sodium fluoride, and zinc chloride. No. 2,400,511. Artemas Holden.

Vehicle for making printing inks consisting of non-aqueous solution in liquid polyglycol of water-miscible salt formed by reacting equimolar proportions of amine and resin. No. 2,400,519. John Kroeger and Daniel O'Connor, Jr. to Fred'k H. Levey Co. Inc.

Additional patents on all other classifications from the above volumes will be given next month.

Abstracts of Canadian Patents

Collected from Original Sources and Edited

Requests for further information or photostated copies of the patents reported below should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published April 9, 1946

Manufacturing starch products by mixing starch with a small amount of water and formaldehyde in a proportion of not less than 2½ per cent and not above 10 per cent, suddenly heating the mixture while pressed into thin layers, to the gelatinizing point whereby the material is simultaneously dried, and then grinding. No. 434,110. Naamlooze Venootschap; W. A. Scholten's Chemische Fabrieken. (Fredrik Andre Moller).

Making a baking yeast having a retarded fermentation action and a long duration of preservation which consists in mixing at room temperature 1000 parts of yeast having a water content of about 70 per cent with from 100-800 parts of saccharose, as well as from 100-800 parts of table salt. No. 434,112. Société Internationale de Procédés de Panification "Itam." (Jean Christian Matti).

Granted and Published April 16, 1946

Complex starch product resulting from the reaction of starch with an aqueous dispersion of a urea-formaldehyde condensation product. No. 434,115. George B. Fowler and Donald K. Pattilloch.

Method of mining bituminous sands and the like. No. 434,142. James Mason McClave.

Blackening surface of copper or copper alloy by immersing in a hot aqueous solution of sodium hydroxide and sodium chlorite. No. 434,-143. Walter R. Meyer.

Fodder comprising desiccated comminuted greens having deposited thereon a coating of dried milk proteins. No. 434,167. American Dairies, Inc. (Lynwood H. Smith and Charles F. Schnabel).

Morpholine and thiamorpholine derivative. No. 434,179. Canadian General Electric Co., Ltd. (Gaetano F. D'Alelio and James J. Pyle).

Insulating material comprising asbestos fibre bonded by a reaction product of lime, slag and diatomaceous earth. No. 434,182. Canadian Gypsum Co., Ltd. (Clyde C. Schuetz).

Resin characterized by solubility in varnish oils, comprising the coester reaction product of an acidic natural resin, a cyclopentadiene adduct of maleic anhydride, and a polyhydric alcohol. No. 434,186. Carbide and Carbon Chemicals, Ltd. (William R. Catlow, Jr.).

As an antioxidant 4,4'-diarylamino diaryl carbonate. No. 434,193. Dominion Rubber Co., Ltd. (Frank Rossiter Valentine, Jr.).

Process for the preparation of shaped carbon articles from a carbon aggregate and pitch. No. 434,197. The Dow Chemical Co. (Edward R. Cole).

Preparation of thiourea by making an aqueous slurry of calcium cyanamide, introducting sulphur dioxide or carbon dioxide to liberate the cyanamide, adding ammonium hydroxide, passing hydrogen sulphide through the reaction mixture. No. 434,199. General Aniline & Film Corp. (Ferdinand J. Gajewski).

Insecticidal and fungicidal compositions containing as an active ingredient a distilled aminated chlorinated kerosene. No. 434,209. The Mathieson Alkali Works. (Charles C. Clark).

Production of chlorine dioxide by reacting a chlorite of an alkali metal or an alkaline earth metal with an aldehyde in the presence of water at a pH below about 9. No. 434,210. The Mathieson Alkali Works. (Clifford A. Hampel).

Stabilizing the iodine content of animal and poultry feed by adding thereto source material a protein containing substance having an affinity for iodine. No. 434,243. Whitmoyer Laboratories, Inc. (Clarence Walter Whitmoyer and William James Moore).

Solution for use in preparing polystyrene material, comprising polystyrene dissolved in a solvent medium consisting essentially of xylene and from 1 to 5 per cent, based on the volume of the solvent, of octyl alcohol. No. 434,246. Camille Dreyfus (William Horback).

Granted and Published April 23, 1946

Method of producing a laminated thermosetting sheet material including the steps of treating a plurality of fibrous sheets with synthetic resin. No. 434,270. Desiré Gonda.

Making optical elements having a plurality of optically polished surfaces from transparent thermoplastic resinous material. No. 434,276. (William Kingston).

Removing shine from fabrics by a solution of a neutral organic sulfonation product wetting agent, brushing the fabric to raise the nap and drying. No. 434,280. (Ralph H. McKee).

Method of producing a multi-ply tubular material for making bags. No. 434,311. Bemis Bros. Bag Co. (Carl W. Pinckert).

Method of obtaining aromatic amines methylated in the nucleus. No. 434,316. The Calico Printer's Association, Ltd. (Abraham Burawoy).

Preparation of 1,1-di(carbomethoxymethoxy)-2-methyl propane by reacting methyl hydroxyacetate with 1,1-dimethoxyisobutane in the presence of an acidic catalyst. No. 434,320. Canadian Industries Ltd. (Donald John Loder, William Franklin Gresham and Donald Bernard Killian).

Dielectric medium comprising, in liquid phase, a chlorobenzotrifluoride in which the chlorine is substituted in the aromatic ring and which boils above 200° C. Canadian Industries Ltd. (Lee Cone Holt and Herbert Wilkins Daudt).

Agricultural mixtures containing sulphur nitride (S_4N_4) and iminosulphur (S_7NH). No. 434,322. Canadian Industries Ltd. (Michael Henry Miller Arnold).

Preparing an alkyl ester which by reacting a cyclic formal with carbon monoxide in the presence of an acidic catalyst and esterifying. No. 434,325. Canadian Industries Ltd. (William Franklin Gresham).

Shaped body composed of a synthetic linear polyamide having a pearlescent effect due to the presence of minute elongated voids. No. 434,326. Canadian Industries Ltd. (William Henry Markwood, Jr.).

Process for the production of alpha, omega-dicarboxylic acids. No. 434,327. Canadian Industries Ltd. (William Edward Hanford).

Process for producing films and filaments by from solid ethylene polymers extruding in the absence of oxygen. No. 434,329. Canadian Industries Ltd. (Elmore Louis Martin).

Composition for removing deposits from acid-corrodible metals comprising 10 to 90 parts by weight of 18° Bé hydrochloric acid and from 90 to 10 parts of a spent lactic acid. No. 434,331. Canadian Industries Ltd. (Aaron Donald Johnson).

Syrup adapted for forming cast sheets between two glass plates consisting of methyl methacrylate polymer dissolved in methyl methacrylate nonomer and containing 0.001% to 0.015% by weight, of methacrylic acid. No. 434,332. Canadian Industries Ltd. (Barnard Mitchel Marks).

Gas Pressure Actuated Fire Extinguisher. No. 434,334. Canadian Industries Ltd. (Elwyn Jones and John Stocks Flanders).

Producing anhydrous magnesium chloride by reacting magnesium oxide, in the form of strong, porous, coherent pieces with chlorine in the presence of coke. No. 434,342. The Consolidated Mining and Smelting Co. of Canada, Ltd. (Robert Lepsoe, Gerald Stanley Ortner and John Henry Salter).

Reaction product of a mixture comprising formaldehyde, methyleneaminoacetonitrile, octadecanoyl chloride and pyridine useful in textile treating. No. 434,368. Montclair Research Corporation. (John Beeckman Rust).

Detoxicant comprising glycine, cystine, a soluble salt of glucuronic acid, ascorbic acid, nicotinic acid, and choline. No. 434,395. William R. Warner & Co., Inc. (Gustav J. Martin and Marvin R. Thompson).

Rendering wool-resistant to shrinkage, treating the material in a solution of the gaseous halegen chlorine or bromine. No. 434,407. Wolsey Limited. (Edward Russell Trotman).

Granted and Published April 30, 1946

Stabilized solution of sodium sulphanilamide containing a normal alkali metal sulphite as a stabilizer. No. 434,417. William F. Hamilton, Melvin F. George, Jr. and Eli Simon.

Treating a normally non-water-repellent body with the acid-free oily hydrolysis product obtained by hydrolyzing methyldichlorosilane. No. 434,463. Canadian General Electric Co., Ltd. (Francis J. Norton).

Damping fluid comprising a liquid polymeric organo-siloxane. No. 434,-467. Corning Glass Works (Rob Roy McGregor and Earl Leathen Warrick).

Recovering biotin from the waste liquors produced in the manufacture of fumaric acid by fermentation. No. 434,492. Lederle Laboratories, Inc. (Anne I. Schivek).

Making a water-soluble derivative of 2-methyl-1·4-naphthohydroquinone by esterfying the 2-methyl-1·4-naphthohydroquinone with an acid containing water-soluble groups in addition to those participating in the esterification. No. 434,534. Max Bockmuhl, Heinrich Leditschke, Otto Schaumann and Erich Bartholomaus.

Granted and Published May 7, 1946

Automatic liquid sampler. No. 434,549. Charles W. Morse.

Method of inhibiting formation of black spots on tinned copper. No. 434,564. American Brass Company (Helen Elizabeth Jennison, John Clement Bradley).

Preparing aminotriazines by heating dicyandiamide in a liquid medium in the presence of an alkali stronger than ammonia. No. 434,567. American Cyanamid Company (John M. Grim).

Promoting the decomposition of dicyandiamide by heating in a liquid medium in the presence of zinc chloride. No. 434,568. American Cyanamid Company (George Henry Foster).

Producing melamine by heating cyanamide or dicyandiamide together with lactamide in a liquid heating medium in the presence of a small amount of zinc chloride. No. 434,569. American Cyanamid Company (Jack Theo Thurston).

Inactivation of the browning system causing discoloration of freshly cut surfaces of plant tissue by immersing in an aqueous solution of a thioamide then drying. No. 434,578. Boyce Thompson Institute for Plant Research Inc. (Frank Earl Denny).

Method of preparing hydrocarbon-substituted amino triazine. No. 434,580. Canadian General Electric Company Ltd. (Gaetano F. D'Alelio, James J. Pyle).

Process for the manufacture of derivatives of tropic acid amide. No. 434,600. Hoffman-La Roche Ltd. (F. Hoffman-La Roche & Co. Ltd. Co., Wilhelm Wenner).

Method of preparing a water-soluble carboxethyl cellulose ether from cellulose. No. 434,617. Rohm & Haas Company (Alva L. Houk, Louis H. Bock).

Process of preparing a water-insoluble alkali-soluble carboxethyl cellulose ether. No. 434,618. Rohm & Haas Company (Louis H. Bock, Alva L. Houk).

Preparing a water-soluble carboxethyl ether of starch by reacting water-soluble hydroxide and acrylonitrile. No. 434,619. Rohm & Haas Company (Alva L. Houk, Louis H. Bock).

Producing adhesives by condensing a urea or thiourea with formaldehyde until a condensation product has been formed. No. 434,645. I. G. Farbenindustrie A. Aktiengesellschaft (Hans Scheuermann).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

421,059. Ferro Enamel Corp., Cleveland, Ohio; filed Nov. 17, 1943; Serial No. 465,066; for production of vitrified matte inorganic finishes for metal; since Nov. 10, 1943.

421,232. Niagara Filter Corp., Buffalo, N. Y.; filed Apr. 20, 1944; Serial No. 469,507; for industrial filtration equipment; since Oct. 14, 1942.

421,243. The Gates Rubber Co., Denver, Colo.; filed Jan. 22, 1945; Serial No. 478,865; for adhesive rubber cement; since Oct. 28, 1944.

421,248. Rene D. Wasserman, as Eutectic Welding Alloys Co., N. Y.; filed Mar. 22 1945; Serial No. 481,200; for flux composition for welding, brazing, and soldering; since Feb. 24, 1945.

421,251. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed Apr. 6, 1945; Serial No. 481,821; for caustic soda and soda ash composition for water conditioning; since Nov. 3, 1941.

421,260. Balcom Seed Co. Inc., Greeley, Colo.; filed July 9, 1945; Serial No. 485,555; for insecticides; since Dec. 1, 1944.

421,273. Klenzade Products, Inc., Beloit, Wis.; filed Oct. 5, 1945; Serial No. 489,467; for break and soap builder; since May 1941.

421,648. Margret Koenigsberger, as Nu-Ball Manufacturing & Research Labs., Des Moines, Iowa; filed May 30, 1945; Serial No. 483,974; for floor wax; since Oct. 14, 1944.

421,665. Maas & Waldstein Co., Newark, N. J.; filed Sept. 12, 1945; Serial No. 488,348; for lacquer and coating compositions; since Dec. 16, 1936.

467,307. Atlantic Research Associates, Inc., Newtonville, Mass.; filed Feb. 10, 1944; for plastics, resins, elastomers, and polymers; since June 30, 1942.

468,725. Phillips Petroleum Co., Bartlesville, Okla.; filed Mar. 27, 1944; fluid for automobile radiators to stop leaks; since June 3, 1931.

472,750. Reichhold Chemicals, Inc., Detroit, Mich.; filed July 29, 1944; for oils; since June 1939.

474,554. Standard Development Corp., N. Y.; filed Sept. 23, 1944; for asphalt paint for protection against corrosion; since July 25, 1944.

481,120. Nuodex Products Co. Inc., Elizabeth, N. J.; filed Mar. 20, 1945; for toxicants in fungicides, etc.; since November 1944.

483,723. Samuel H. French Paint Co., Philadelphia, Pa.; filed May 24, 1945; for paint enamels; since August 1944.

485,455. L. Sonneborn Sons, Inc., N. Y.; filed July 4, 1945; for paste for softening mercerized cotton; since December 1919.

487,878. Waverly Petroleum Products Co., Philadelphia, Pa.; filed Aug. 31, 1945; for removing rust scale and tarnish from metals; since Aug. 2, 1945.

488,346. Maas & Waldstein Co., Newark, N. J.; filed Sept. 12, 1945; for coating which provides finish resembling hammered metal; since Feb. 3, 1940.

488,608. Onyx Oil & Chemical Co., Jersey City, N. J.; filed Sept. 17, 1945; for emulsifying fungicidal agent; since Mar. 21, 1945.

488,831. The Patterson Foundry & Machine Co., East Liverpool, Ohio; filed Sept. 21, 1945; for ceramic body mixture for making balls for ball mills; since Mar. 8, 1945.

490,152. Twin City Shellac Co. Inc., Brooklyn, N. Y.; filed Oct. 18, 1945; for wax cleaner and polish; since Sept. 4, 1945.

490,412. American Cyanamid Co., N. Y.; filed Oct. 24, 1945; for finishing resins for stiffening and control of stretching, shrinking and color fastness of textiles; since Oct. 9, 1945.

490,614. Carl O. Willenberg, as Royal Products Co., Los Angeles, Calif.; filed Oct. 27, 1945; for weather and flame-resistive, adhesive liquid, asphaltic-asbestos, paint-like coatings; since July 1942.

490,961. Packard Paint & Varnish Co., Boston, Mass.; filed Nov. 2, 1945; for dry paste, and ready mixed paints; since Jan. 1, 1941.

490,962. Elizabeth Wesion Parker, Washington, D. C.; filed Nov. 2, 1945; for dry pulverulent detergents; since Sept. 21, 1945.

490,997. Celanese Corp. of America, N. Y.; filed Nov. 3, 1945; for sheets, etc., capable of being molded under heat and/or pressure and made of cellulosic plastic; since Oct. 30, 1945.

491,151. California Spray-Chemical Corp., Wilmington, Del., and Richmond, Calif.; filed Nov. 6, 1945; for parasiticides; since Mar. 10, 1907.

491,249. Durite Corp., Detroit, Mich.; filed Nov. 8, 1945; for polishing wax, paint remover; since Oct. 15, 1945.

491,333. International Lubricant Corp., New Orleans, La.; filed Nov. 9, 1945; for lubricating oils and greases; since Mar. 1, 1937.

491,344. Laboratory Products Corp., N. Y.; filed Nov. 9, 1945; for insecticides; since Oct. 29, 1945.

491,473. General Solvents Sales Co. Inc., Rochester, N. Y.; filed Nov. 13, 1945; for liquid solvent and cleaner for removing tar, wax, oil; since Oct. 29, 1945.

491,514. Rohm & Haas Co., Philadelphia, Pa.; filed Nov. 13, 1945; for insecticides, fungicides, and disinfectants; since Sept. 25, 1945.

491,562. The B. F. Goodrich Co., N. Y., and Akron, Ohio; filed Nov. 14, 1945; for raw thermosetting resins; since Sept. 7, 1945.

491,765. The Mason Paint Co., Louisville, Ky.; filed Nov. 17, 1945; for paints; since June 1940.

492,617. Daizee Products Co., Rego Park, N. Y.; filed Dec. 4, 1945; for dry-cleaning and water-repellent compound; since Oct. 24, 1945.

493,173. E. I. du Pont de Nemours & Co., Wilmington, Del.; filed Dec. 13, 1945; for paint pigments; since Feb. 26, 1940.

493,771. Curtis J. Harwick, as Standard Chemical Co., Akron, Ohio; filed Dec. 22, 1945; for plasticizer, binder, and extender for rubber; since Oct. 29, 1943.

493,949. Dorward & Sons Co., San Francisco, Calif.; filed Dec. 28, 1945; for animal, vegetable and mineral oils for industrial use; since Sept. 13, 1945.

494,151. Wesco Waterpaints, Inc., Berkeley, Calif.; filed Dec. 29, 1945; for paints in paste form; since Nov. 5, 1945.

494,214. Grant Photo Products, Inc., N. Y.; filed Jan. 3, 1946; for photographic developing solution; since Dec. 12, 1945.

495,236. Industrial Oil Products Corp., Los Angeles, Calif.; filed Jan. 23, 1946; for processed oil used in blending marine engine oil; since Apr. 10, 1940.

496,347. Sun Oil Co., Philadelphia, Pa.; filed Feb. 9, 1946; for radiator stop leak compound, etc.; since May 16, 1944.

496,597. B. T. Babbitt, Inc., Albany, N. Y.; filed Feb. 15, 1946; for lye; since 1882.

496,858. Perkins Glue Co., Lansdale, Pa.; filed Feb. 18, 1946; for casein glue; since January 1938.

496,874. Tennessee Eastman Corp., Kingsport, Tenn.; filed Feb. 18, 1946; for inhibitor to retard deterioration of organic material; since Oct. 1, 1940.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, May 14-June 4.

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154.	Rosenthal, H. H., Co.	563
155.	Saranac Machine Co.	519
156.	Schmitt-Jourdan Etablissements	570
157.	Scientific Publishing Corp.	551
158.	Sharples Chemicals, Inc.	Insert between pages 420 and 421
159.	Shell Chemical Corp.	421
160.	Signode Steel Strapping Co.	443
161.	Snell, Foster D., Inc.	570
162.	Sobin, Irving M., Co., Inc.	566
163.	Solvay Sales Corp.	Inside Front Cover
164.	Spencer Chemical Co.	461
165.	Standard Alcohol Co.	561
166.	Standard Oil Co. (Indiana)	451
167.	Standard Silicate Div. of Diamond Alkali Co.	450
168.	Stanhope, R. C., Inc.	568
169.	Starkweather, J. U., Co.	566
170.	Stauffer Chemical Co.	431
171.	Sundheimer, Henry, Inc.	420
172.	Swope Oil & Chemical Co.	573
173.	Tarbonis Co.	508
174.	Tennessee Corp.	553
175.	Texas Gulf Sulphur Co., Inc.	561
176.	Towmotor Corp.	435
177.	Ultra Chemical Works, Inc.	445
178.	Union Carbide & Carbon Chemical Corp.	
179.	Union Standard Equipment Co.	568
180.	U. S. Automatic Box Machinery, Inc.	507
181.	U. S. Industrial Chemicals, Inc.	Insert between pages 544 and 545
182.	U. S. Industrial Chemicals, Inc.	446
183.	U. S. Potash Co.	509
184.	U. S. Stoneware Co.	520
185.	Velsicol Corp.	449
186.	Victor Chemical Works	499
187.	Welch, Holme & Clark Co., Inc.	502
188.	Westvaco Chlorine Products Corp.	413
189.	Winthrop Chemical Co.	508
190.	Witco Chemical Co.	Back Cover
191.	Witco Chemical Co., Franks Stearate Div.	537
192.	Wyandotte Chemicals Corp.	448

Name_____

Position_____

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CHEMICAL INDUSTRIES: Sept. 1946

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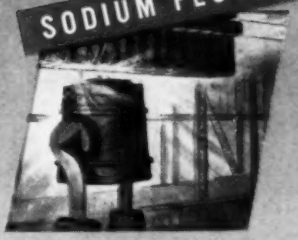
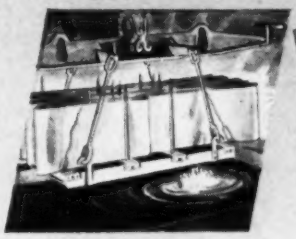


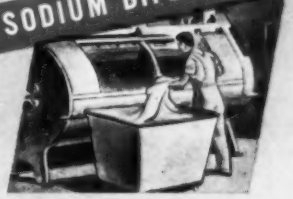
RIMMING STEEL: Used in pouring billets to insure a smooth rolled sheet

WOOD PRESERVATIVE: To prevent insect attack on structural and other materials

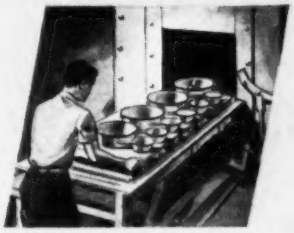


STAINLESS STEEL: As a Hydrofluoric Acid substitute in pickling

SODIUM BIFLUORIDE

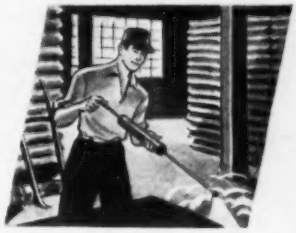


LAUNDRIES: To neutralize excesses of soap and other alkaline detergents; to remove iron stains



ENAMELWARE. As a fluxing agent

GLASS: As an etching and frosting agent



PEST EXTERMINATION: As a vermin destroyer

MAINTENANCE: In cleaning stone and concrete surfaces

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

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ALL THIS... *and quiet, too!*

The modern kitchen equipment now becoming available is a delight to the eye, no doubt about that. It's a delight to the ear, too, for "tinny" sounds from usual kitchen operations are reduced to a minimum through the use of "Witco vibration dampeners" — scientifically compounded asphalt compositions which are readily sprayed on the under surface of steel utility cabinets, dish washers, sinks, window ventilators and ventilating ducts.

Witco Research Laboratories have developed several grades of vibration dampeners to deaden sound, seal seams and give thermal insulation with protection against corrosion. These are also widely used in the manufacture of automobile doors, body panels and fenders, railway cars, office furniture, steel cabinets, portable steel partitions, air conditioning units and in many sheet steel products subject to mechanical vibration. From the manufacturing viewpoint, ease of spray application and improvement in cleanliness are advantages that promote their use on high-speed production lines.

Here, then, is yet another example of Witco's contributions to industrial progress in such fields as steel fabrication, rubber compounding, paper and ink-making, plastics, paints, cosmetics and drugs, ceramics and leather.

• • •

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